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Technical Report 917

Sample Representativeness in the
New Recruit Surveys:
Seasonality Effects

Mary Sue Hay
U.S. Army Research Institute

December 1990

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United States Army Research Institute
for the Behavioral and Social Sciences

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ABSTRACT (Continue on reverse if necessary and identify by block number)
 >For this report, the researchers analyzed data from 2 years of the U.S. Army Recruiting Command (USAREC) New Recruit Survey (NRS) to see whether substantial seasonal variations in characteristics of accessions exist. Variables were selected for investigation based on preliminary Chi-square analyses conducted on 1 year of NRS data. Results indicate that Armed Forces Qualifying Test (AFQT) category, age at contract, sex, geographic region, enlistment month, length of Delayed Entry Program (DEP), first contact with an Army recruiter, and circumstances of first contact appear to have substantial seasonal effects. Enlistment motivations and loss of enlistment incentives show some statistically significant differences across the year, but seasonal effects may not be of practical significance. Ethnicity, educational levels, plans to use the G.I. Bill, and hometown size do not seem to have seasonal patterns among new recruits. In general, for variables that are affected, the major contrast is between summer and winter accessions.<

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Technical Report 917

Sample Representativeness in the New Recruit Surveys: Seasonality Effects

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FOREWORD

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) conducts research to enhance recruiting success and to develop cost-effective recruiting policies and practices for the U.S. Army. To support their studies on recruiting, the U.S. Army Recruiting Command (USAREC) collects data from the New Recruit Survey (NRS), a survey of new soldiers administered when they first enter the Army. This report examines seasonal variations in the demographic characteristics and survey responses of soldiers at accession. It is the first report of a planned two-part effort on the broader issue of sample representativeness in the NRS.

This work is part of the mission of the Manpower and Personnel Policy Research Group (MPPRG) of ARI's Manpower and Personnel Research Laboratory to conduct research to improve the Army's capability to recruit its personnel effectively and efficiently. MPPRG was asked to investigate seasonality in the NRS by USAREC. Preliminary results were provided to USAREC on 6 June 1990, and were briefed to Major Hershberger, Chief of Advertising Research and Analysis, USARCPAE, on 12 July 1990.

The New Recruit Surveys provide continuing information about the enlistment motivations, attitudes, knowledge, and personal characteristics of U.S. Army accessions. The results reported here will aid USAREC in designing the best survey sampling methods, in order to assure that the NRS provides the most accurate information for Army policymakers and personnel planners. Information on seasonal variations in the characteristics of new soldiers should also prove useful to planners and administrators of training programs.



EDGAR M. JOHNSON
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SAMPLE REPRESENTATIVENESS IN THE NEW RECRUIT SURVEYS:
SEASONALITY EFFECTS

EXECUTIVE SUMMARY

Requirement:

The U.S. Army Recruiting Command's (USAREC) New Recruit Survey (NRS) is undergoing revision and updating. One possibility for reducing the cost of the NRS is to administer it only to summer accessions. Before doing this, it is necessary to determine whether seasonal variations exist in the data that would lead to biased conclusions if only summer accessions were surveyed.

Procedure:

Researchers analyzed data from 2 years of the NRS (June 1987 through May 1989) using Chi-square analyses and analysis of variance (ANOVA) approaches with mean comparisons and trend analysis. The variables selected included several demographic and personal characteristics, contract variables, and responses to survey items, and were chosen on the basis of preliminary Chi-square analyses conducted on the 1987/1988 NRS data.

Findings:

Some of the demographic and contract variables, as well as responses to survey questions, appear to have substantial seasonality effects. These include Armed Forces Qualifying Test (AFQT) category, age at contracting, sex, geographic region, enlistment term, time in the Delayed Entry Program (DEP), first contact with an Army recruiter, and the circumstances of that contact. Seasonal effects do not appear to be meaningful for enlistment motivations, effects of loss of enlistment incentives, ethnicity, educational goals, plans to use the G.I. Bill, and hometown size. In general, the major difference appears to be between summer and winter accessions.

Utilization of Findings:

These results will help USAREC to decide whether to continue the NRS on a year-round basis and to plan other research on accessions. They will ensure that the most efficient and cost-effective information is provided for Army policymaking and personnel planning. Results may also be useful to planners and administrators of training programs and may aid other analysts of the NRS data in interpreting their results.

SAMPLE REPRESENTATIVENESS IN THE NEW RECRUIT SURVEYS:
SEASONALITY EFFECTS

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SAMPLE REPRESENTATIVENESS IN THE NEW RECRUIT SURVEYS: SEASONALITY EFFECTS

INTRODUCTION

This report is provided as a source of background information for users of data collected by the U.S. Army Research Institute's (ARI) and U.S. Army Recruiting Command's (USAREC) New Recruit Survey (NRS). This document briefly describes the survey's history and examines the question of seasonality in the NRS data. It is intended to provide both background material and information useful in developing future surveys. These results may also be useful in understanding differences in recruits entering the training base at different times of the year.

NRS Project Background

The New Recruit Survey was originally developed by ARI in 1982, under a commission by the Deputy Chief of Staff for Personnel, to investigate the enlistment motivations, attitudes, knowledge, and demographic characteristics of new recruits at the time they first enter the U.S. Army. In 1984 the U.S. Army Recruiting Command assumed sponsorship of the survey. The surveys have been administered annually, with revisions in content and format, to track the characteristics of new recruits over time and to provide data for use in developing and supporting the Army's recruiting strategies and policies.

Research projects conducted in the NRS series include: (1) Summer, 1982; (2) Summer, 1983; (3) Winter, 1983; (4) Summer, 1984; (5) Winter, 1984; (6) Summer, 1985; (7) Summer, 1986; (8) 1987/1988 (12-month data collection); (9) 1988/1989 (12-month data collection); (10) 1989/1990 (12-month data collection); and (11) 1990/1991 (data currently being collected). Starting in June 1987 USAREC began collecting NRS data on a year-round basis, with three administration and reporting periods. Under this sampling plan, the year is divided into trimesters, based in part on the annual recruit intake volume.

Trimester 1 (Summer): June - August
Trimester 2 (Fall) : September - December
Trimester 3 (Winter): January - May

For detailed descriptions of questionnaire development, administrative procedures, data analysis, and available documentation, see Benedict (1987) and Data Recognition Corporation (1988, 1989).

Although the New Recruit Survey has undergone changes in sponsorship, question content, and administration, it has retained its basic charter of attempting to determine (1) who is enlisting in the U.S. Army and why, (2) how to target recruiting resources to attract high quality recruits, (3) why recent recruits have joined and their propensity to remain in the

service, and (4) which recruiting and advertising practices are proving the most effective and why.

The New Recruit Surveys provide a substantial amount of material for use in marketing and program evaluation; however, the survey has expanded over time to become a major expense as well as an extremely large instrument. One possibility for reducing the cost of the NRS is to decrease the size of the sample by returning to a summer-only administration of the survey. In order to do this, however, we need to know whether a sample drawn only from recruits entering during the summer months would still be representative of the entire year's recruits, in terms of both population demographics and responses to survey items. This report focuses on one aspect of sample representativeness: seasonality effects in the NRS data.

Analysis Plan

Conceptually, the problem is this: In any given year, the population of new recruits first entering the Army will have certain characteristics in terms of demographic factors and responses to survey items. What we need to determine is if a sample drawn from summer accessions will represent that whole year, or, if not, what adjustments we would have to make to the data from the sample in order to obtain information that would accurately represent that year's recruits.

From a marketing perspective, the critical items would seem to be the recruits' most important reasons for enlisting, their first contacts with a recruiter, the circumstances of that first contact, their enlistment terms, and the effects of certain incentives not being available. Consequently, the main focus should be on these variables. Examination of demographic questions is designed primarily to ensure that response differences arising from, for example, age or geographic region, are not mistaken for trimester differences because the demographic factors are not equally represented in the three sampling periods. The purpose throughout should be to answer three questions regarding the data across the year: (1) Are there, in fact, differences among the three trimesters? (2) Are such differences, where they exist, of any practical significance? (3) What can we do to resolve any significant differences--for example, weight the data or sample year-round? Given this general problem, then, several approaches can be taken.

First, we now have two full years' worth of NRS data from year-round administrations from June 1987 through May 1989. These data can be examined for seasonality effects. Second, for some of the demographic and contract variables (e.g., age, sex, AFQT score, enlistment term), information is available from Army and MEPCOM records for the entire year's accessions. Using this information, we can calculate population characteristics and then compare them to estimates based on a summer sample. Third, fo-

the variables discussed above which are not available from Army records, we can compare responses for an entire year's survey data to those based on only the summer trimester. Fourth, we can attempt to develop ways of weighting the data so that a summer sample will adequately represent the entire year.

The primary focus in this report is on the first approach above--determining seasonality effects--with a view toward answering the questions of whether there are trimester differences and whether they are important in a practical sense. All analyses here are limited to recruits without prior military service.

Limitations of Analysis

We should note that although having data from two full years is certainly more desirable than only one year, it would be far better to have three years' worth of NRS data. Even with two years, basically we are limited to six data points (e.g., proportions in each of six trimesters). Thus, the conclusions will be based on limited data.

Another consideration is that our analyses are based on the particular time at which the new soldiers are surveyed--at accessioning into the Army. Consequently, we are examining seasonality in accessions, rather than seasonality in contracts. The NRS data can also be analyzed based on the time at which recruits signed their contracts for Army enlistment to examine seasonality in contracting. Such analyses are planned as the second phase of investigating NRS sample representativeness.

Seasonality Issues

The basic question is whether there are consistent seasonal differences in the data. Seasonality refers to intra-year variation which is repeated in a constant or evolving fashion from year to year. Our concern here is not so much with whether seasonal differences among accessions exist, as it is with determining the practical impact such differences might have on utilizing data from the NRS, and with finding ways to overcome problems of data interpretation resulting from any seasonality effects.

In the case of the NRS data, we already know that at least one seasonal component is present: the volume of new recruits entering the Army. We also know that a summer sample is heavily biased toward recent high school graduates. Summer accessions typically include a high percentage of young people who were recruited and signed contracts during their senior year in high school, entered the Delayed Entry Program (DEP), and then entered the Army during the summer following their graduation. This might be considered a defining characteristic of the summer sample. In addition, there are several other variables which may vary somewhat among the trimesters. Based on Schroyer, Gaskins,

and Waters' (1988) analyses comparing trimesters of the 1987/1988 NRS data, there are a number of areas in which relying solely on summer accessions might provide nonrepresentative data.

In general, Schroyer et al.'s (1988) analyses suggest that a summer sample would be biased toward young men from rural Midwestern areas who contracted at age 17. These recruits would have spent a longer than average period in the DEP, would have enlisted for a two-year term, and would have joined the Army for the opportunity of serving the country, rather than for reasons of unemployment, the chance to better themselves, college money, or training. Their first contact with an Army recruiter would have been at school, and that contact would have been initiated by the recruiter rather than the student. In addition, they do not desire any education beyond high school, nor do they plan to use the G.I. Bill.

Schroyer et al.'s findings may result from true seasonal effects, anomalies in the data from that particular year, or the type of analysis which was conducted. Therefore, we consider them potential hypotheses to be tested, rather than final conclusions. That is, these are results which we can attempt to replicate with a larger sample, thereby either verifying or eliminating them as considerations.

In addition to the above, in which there is already some indication of trimester variability, there are two other variables which we believe warrant analysis. First, ethnicity should be examined. Although there do not appear to be major differences in the proportions of ethnic groups across the trimesters, Hispanic and other minority groups represent an increasingly important market for Army recruiting. Therefore, this is an important variable. Second, the effect of the absence of certain enlistment incentives should be investigated. These data apparently were not analyzed by Schroyer, et al.; thus, we have no initial hypotheses to guide us. These are important questions, however, and the data need careful analysis.

DATA COLLECTION METHOD

The New Recruit Survey was administered to new soldiers as they underwent in-processing at the reception battalions. Each of the eight reception battalions was visited for one week (randomly assigned) during each trimester, and an attempt was made to survey all recruits who were present at the reception battalion during that week. The NRS questionnaires were administered to groups of new recruits during one-hour periods. Average response rates of 93% and 95% were achieved for the 1987/88 and 1988/89 administrations, respectively. (See Data Recognition Corporation, 1988, 1989, for further details of the sampling plan and questionnaire administration.)

For the 1987/88 NRS, 7005 Active Army recruits were surveyed; of these 7005 new recruits, 6862 did not have prior

military service (non-prior-service, or NPS) and are our only concern here. For the 1988/89 administration of the NRS, 5863 Active Army recruits were included in the survey; of these, 5697 did not have prior military experience. By trimester, the sample breaks down as follows: Summer 1987, 3009; Fall 1987, 2357; Winter 1988, 1496; Summer 1988, 1822; Fall 1988, 2209; and Winter 1989, 1666. All figures are for NPS recruits.

RESULTS

Preliminary Analyses

Preliminary Chi-square analyses were conducted in an effort to narrow the number of variables under consideration in trying to determine sample representativeness. In all cases, only those new recruits without prior military service were included in the analysis. In general, our findings tend to parallel those of Schroyer et al. (1988) where trimester differences were found. However, there are two variables which we believe do not require intensive examination in further evaluations of the NRS data, on grounds that there does not seem to be any real difference among trimesters. These two variables are described below.

Ethnic Group Membership

Confirming Schroyer et al.'s (1988) finding, our analysis of the ethnic composition of the 1987/1988 sample indicates similar proportions of ethnic groups across the three sampling periods ($\chi^2_{(6)}=11.51$, ns). As shown in Figure 1, the trimesters are very much alike in terms of ethnic groups.

By contrast, our analysis of the 1988/1989 data does suggest a significant difference ($\chi^2_{(6)}=24.08$, $p<.01$). However, a plot across all six trimesters of the proportions of ethnic groups in each sampling period (see Figure 2) suggests that the significant Chi-square statistic for 1988/1989 simply represents a slight variability in the data for the Fall 1988 sample, rather than a genuine dissimilarity among trimesters. Therefore, it appears that achieving a well-balanced sample in terms of ethnic groups should not present major difficulties.

Participation in G.I. Bill.

Although Schroyer et al.'s (1988) analysis of the 1987/1988 data suggested possible trimester differences in the proportions of new recruits planning to utilize the G.I. Bill, these results may be due to including the entire sample in the analysis. Recruits' plans concerning use of the G.I. Bill may depend upon whether or not they have yet discussed the matter with Reception Battalion personnel at the time they complete the survey. That is, new recruits who have already been presented with this information may respond differently than those who have not. Our reanalysis of this survey item based on only those recruits who (1) had heard about the basic New G.I. Bill program, and (2) had

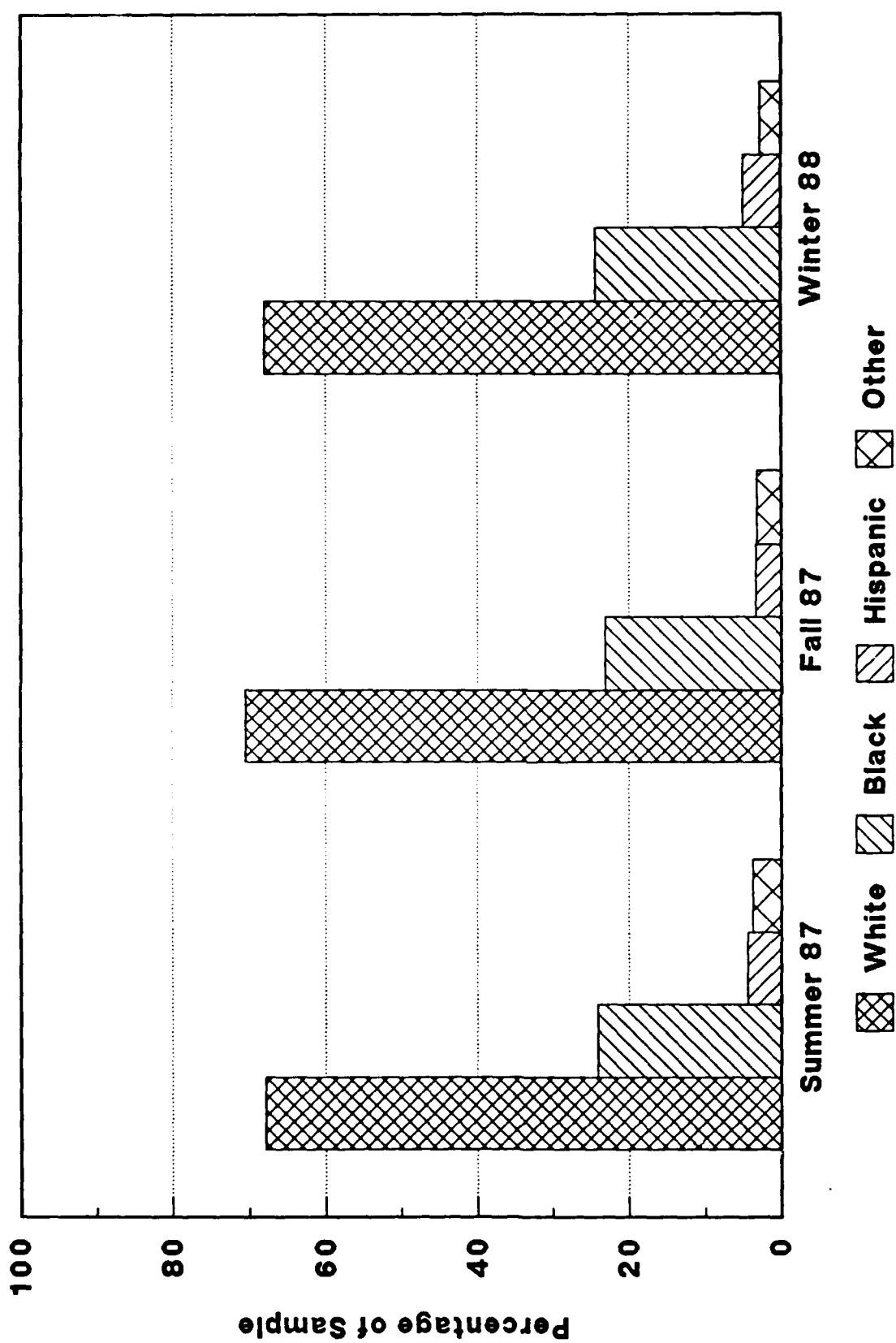


Figure 1. Ethnic groups in 1987/1988 sample

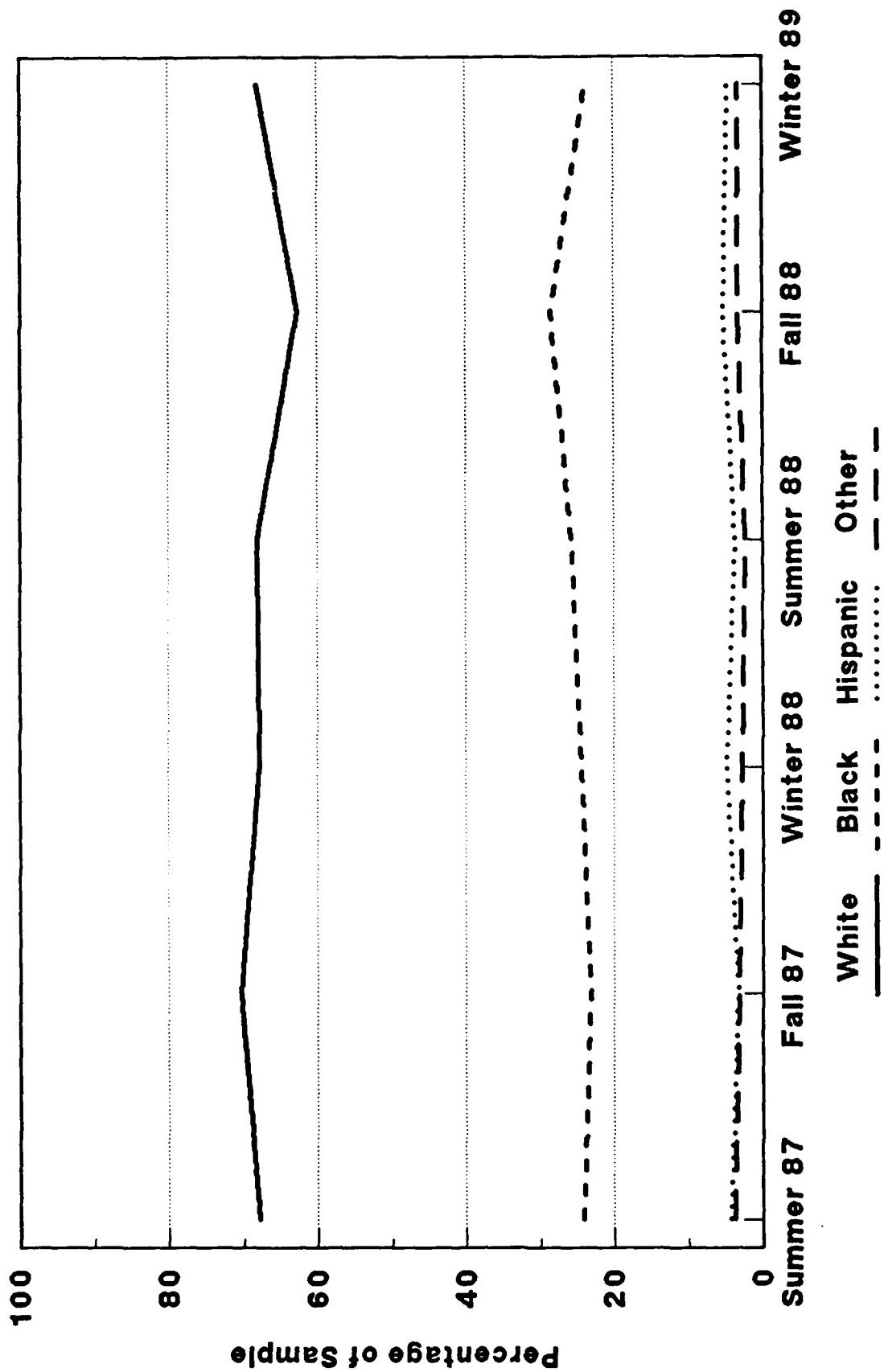


Figure 2. Ethnic groups over two years

not yet talked with a counselor at the reception station about the Bill, failed to find any significant differences among the trimesters ($\chi^2_{(4)} = 2.66$, ns). Note in Figure 3 that the basic pattern of responses is almost identical across the three trimesters. Thus, we do not believe this particular variable warrants further investigation.

Analysis of Variance Approach

Several of the variables showing significant trimester differences in the original Chi-square analyses conducted by Schroyer et al. (1988) might be thought of as consisting of ordinal, or perhaps even interval, data. That is, although the data are coded in categories, those categories represent an underlying continuum, and can therefore be ordered to reflect increasing amounts of the variable in question. Given this assumption, it is reasonable to test the hypothesis of trimester differences using an analysis of variance (ANOVA) approach with effects coding to compare means among trimesters. Although generally used for continuous dependent variables, the method is quite robust even when assumptions about the nature of the data are violated.

If we make the further assumption that the independent variable (i.e., trimester) reflects the continuous variable of time, rather than simply a categorical factor, then we can also conduct trend analysis using orthogonal polynomial coefficients (Keppel, 1973; Kerlinger & Pedhazur, 1973) to determine what kind of function(s) best describes fluctuations in the dependent variable over time. Orthogonal polynomials are simply a way of assigning values to the trimesters in order to reflect different patterns of change over time. Figure 4, for example, shows four different patterns which we might find in the NRS data. Typically, we would wish to discover the simplest function which will adequately describe the data (Kerlinger & Pedhazur, 1973). Orthogonal polynomials have the advantage of being mutually independent, so that they can be directly compared to one another. Although it does not appear that this approach has been used before to test for seasonality effects, the trend analysis technique seems appropriate to the question here, since it does represent a way of checking for cyclical patterns of change.

These analyses were restricted to recruits without prior military service, and all variables were coded so that higher values would indicate higher levels of the variable in question. Where possible, the original interval variables (e.g., age, enlistment term, and DEP time) were used, rather than the ordinal forms created by categorizing them. In all cases, a one-way ANOVA was first conducted to determine if significant differences existed among the six trimesters. If the omnibus F-test was significant, we then conducted planned comparisons and trend analysis.

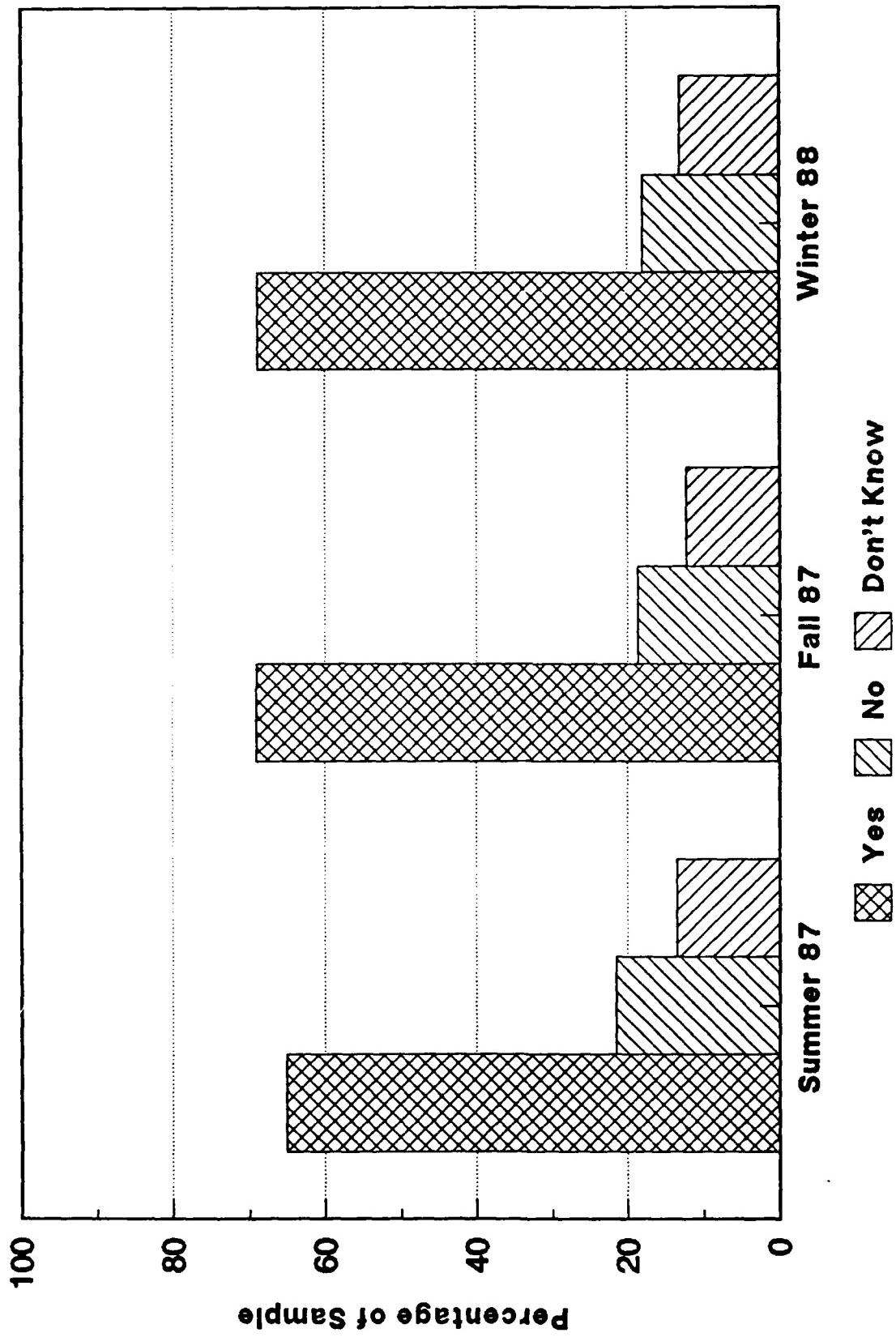


Figure 3. Plans to participate in G.I. Bill

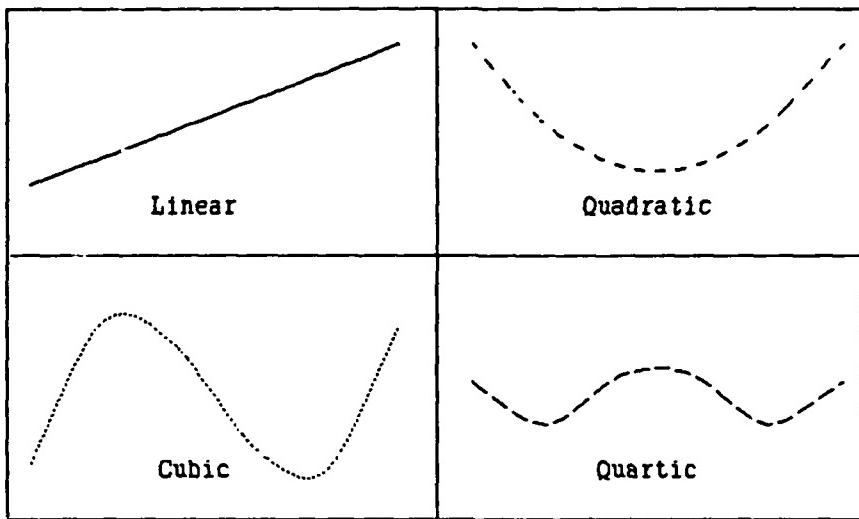


Figure 4. Trend Lines

Demographic and Contract Variables

The approach described above is, of course, only appropriate for those variables where we can make some sort of case for considering the categories as ordered--for example, mental category or educational goals. It is not suitable for variables which are truly categorical in nature, such as geographic region. Consequently, our analyses here are limited to AFQT category, age at contract, size of hometown, education goals, enlistment term, and length of time in the DEP.

Table 1 shows the mean and standard deviation for each variable by trimester and the results of each ANOVA. Sample sizes vary from 11704 to 12553, due to missing data. The R^2 value shown in the table represents the proportion of the variability in the dependent variable which can be attributed to the independent variable, trimester. For purposes of interpretation and decision making, the R^2 value should probably be a minimum of .05, regardless of the probability level, to be considered meaningful. That is, differences among trimesters ought to be able to account for at least 5% of the variability to be judged of any practical significance. Although an R^2 of .05 might ordinarily be considered trivial (e.g., see Kerlinger & Pedhazur, 1973; cf. Pulakos, White, Oppler, & Borman, 1989), it will give us a conservative test of the magnitude of trimester differences. Table 2 contains the results of the planned comparisons and trend analysis. Results are discussed below.

AFQT category. The initial Chi-square analysis by Schroyer et al. (1988) suggested that summer samples would underrepresent the higher Categories I and II and overrepresent Category III-B. In terms of an ordinal variable, this means that AFQT categories in the summer trimester should on average be lower than those in

Table 1

**Item Means and Analysis of Variance Results
for the Demographic and Contract Variables**

Variable	<u>Trimester</u>						<u>ANOVA Results</u>	
	Summer 1987	Fall 1987	Winter 1988	Summer 1988	Fall 1988	Winter 1989	F	R ²
AFQT Category^a								
M	4.98	5.28	5.35	5.10	4.93	5.84	174.97	.069
SD	0.97	0.90	1.19	1.05	1.15	1.30		
Age at Contract								
M	18.54	19.27	20.45	18.05	19.45	19.99	208.82	.077
SD	2.43	2.83	3.08	1.98	2.67	2.76		
Size of Hometown^b								
M	2.79	2.85	3.06	2.74	2.98	2.98	13.56	.006
SD	1.44	1.42	1.45	1.42	1.43	1.45		
Education Goals^c								
M	4.53	4.76	4.67	4.53	4.52	4.56	10.47	.004
SD	1.41	1.30	1.34	1.40	1.42	1.41		
Enlistment Term								
M	3.36	3.42	3.69	3.69	3.91	3.90	226.43	.083
SD	0.71	0.71	0.70	0.81	0.77	0.83		
Days in the DEP^d								
M				206.86	94.87	58.95	1305.42	.314
SD				116.67	82.02	64.47		

Note. All F's are significant at p<.001. Sample sizes vary from 11704 to 12553.

^aCoded as 1=Categories IV-C and V, 2=Category IV-B, 3=Category IV-A, 4=Category III-B, 5=Category III-A, 6=Category II, and 7=Category I. ^bCoded as 1=Rural/Farm Area, 2=Town, 3=Suburb, 4=Medium City, and 5=Large City.

^cCoded as 1=None, 2=G.E.D., 3=High School Diploma, 4=Associate's, 5=Bachelor's, and 6=Doctorate or Master's. ^dIncludes data from 1988/1989 only.

Table 2

**Planned Comparisons and Trend Analyses
for the Demographic and Contract Variables**

Variable	F	p	R ²
AFQT Category^a			
Trimester Comparisons:			
Summer vs. Others	219.34	.0001	.017
Summer vs. Fall	8.52	.0035	.001
Summer vs. Winter	468.38	.0001	.037
Trend Components:			
Linear	231.48	.0001	.018
Quadratic	80.64	.0001	.006
Cubic	567.38	.0001	.045
Quartic	66.46	.0001	.005
Age at Contract			
Trimester Comparisons:			
Summer vs. Others	912.39	.0001	.068
Summer vs. Fall	374.20	.0001	.028
Summer vs. Winter	993.40	.0001	.074
Trend Components:			
Linear	130.02	.0001	.010
Quadratic	0.00	.9639	.000
Cubic	410.04	.0001	.030
Quartic	4.27	.0387	.000
Size of Hometown^b			
Trimester Comparisons:			
Summer vs. Others	53.44	.0001	.004
Summer vs. Fall	23.68	.0001	.002
Summer vs. Winter	55.74	.0001	.005
Trend Components:			
Linear	15.31	.0001	.001
Quadratic	0.28	.5976	.000
Cubic	9.87	.0017	.001
Quartic	0.52	.4708	.000
Education Goals^c			
Trimester Comparisons:			
Summer vs. Others	14.06	.0002	.001
Summer vs. Fall	14.72	.0001	.001
Summer vs. Winter	6.82	.0090	.001
Trend Components:			
Linear	7.98	.0047	.001
Quadratic	4.70	.0302	.000
Cubic	32.62	.0001	.003
Quartic	4.97	.0258	.000

Table 2 continued

**Planned Comparisons and Trend Analyses
for the Demographic and Contract Variables**

Variable	F	p	R ²
Enlistment Term			
Trimester Comparisons:			
Summer vs. Others	216.05	.0001	.016
Summer vs. Fall	82.64	.0001	.006
Summer vs. Winter	244.98	.0001	.018
Trend Components:			
Linear	970.04	.0001	.071
Quadratic	10.87	.0010	.001
Cubic	10.45	.0012	.001
Quartic	0.03	.8676	.000
Days in the DEP^d			
Trimester Comparisons:			
Summer vs. Others	2542.79	.0001	.306
Summer vs. Fall	1531.02	.0001	.184
Summer vs. Winter	2328.25	.0001	.280
Trend Components:			
Linear	2328.25	.0001	.280
Quadratic	239.00	.0001	.029

Note. Sample sizes vary from 11704 to 12553.

^aCoded as 1=Categories IV-C and V, 2=Category IV-B, 3=Category IV-A, 4=Category III-B, 5=Category III-A, 6=Category II, and 7=Category I. ^bCoded as 1=Rural/Farm Area, 2=Town, 3=Suburb, 4=Medium City, and 5=Large City. ^cCoded as 1=None, 2=G.E.D., 3=High School Diploma, 4=Associate's, 5=Bachelor's, and 6=Doctorate or Master's. ^dIncludes data from 1988/1989 only.

the other trimesters. Results of the ANOVA and planned comparisons corroborate that this is the case. In addition to significant differences among trimesters (as indicated by the overall F test, see Table 1), the mean AFQT category is significantly lower in the summer than in the fall, the winter, or the other two trimesters combined. Trend analysis indicates that linear, quadratic, cubic, and quartic trends are all present, with the cubic trend the strongest and the only one which accounts for a meaningful proportion of the variance in AFQT categories. Figure 5 shows a plot of the mean AFQT category across the six trimesters.

Age at contract. If a summer sample would underrepresent 19-year-olds and overrepresent 17-year-olds, as indicated by the original Chi-square analysis, then we should find a lower mean age for summer accessions. This is confirmed by the ANOVA and planned comparisons. As shown in Figure 6, there is a clear seasonal pattern across the two years of NRS data, with the summer accessions the youngest, winter accessions the oldest. Although the linear, cubic, and quartic trends are statistically significant, note that none account for much of the variability in age.

Size of hometown. Original analyses indicated that summer samples would underrepresent accessions from large urban areas and overrepresent those from rural areas, while having little effect on accessions from the mid-sized areas. Accordingly, we would expect to find a smaller average hometown size among the summer accessions, and this is shown by the ANOVA. However, trimester differences account for less than 1% of the variability in hometown size. Figure 7 shows a plot of the average hometown size over the two years. A slight seasonality can be seen in the figure, but overall the plot is relatively flat. Consequently, seasonality in this variable does not seem to be of any real significance.

Educational goals. Chi-square analysis showed that a summer sample would tend to overrepresent accessions desiring only a lower level of education (i.e., a high school degree). Thus, we would expect to find a lower mean level of educational goals for the summer trimesters. Significant ANOVA results indicate that this is true; however, since trimester accounts for less than 1% of the variability in educational goals, this seasonality is probably not of any practical significance. Figure 8 shows a plot of the mean educational goal over the six trimesters. Although a slight seasonality effect is shown, the line is quite level.

Enlistment term. The initial analysis suggested that two-year enlistments would be slightly overrepresented among summer accessions, while four-year enlistments would be underrepresented. If so, we should find a lower average enlistment term (in years) for the summer samples. Significant ANOVA results confirm that this is true. The average enlistment

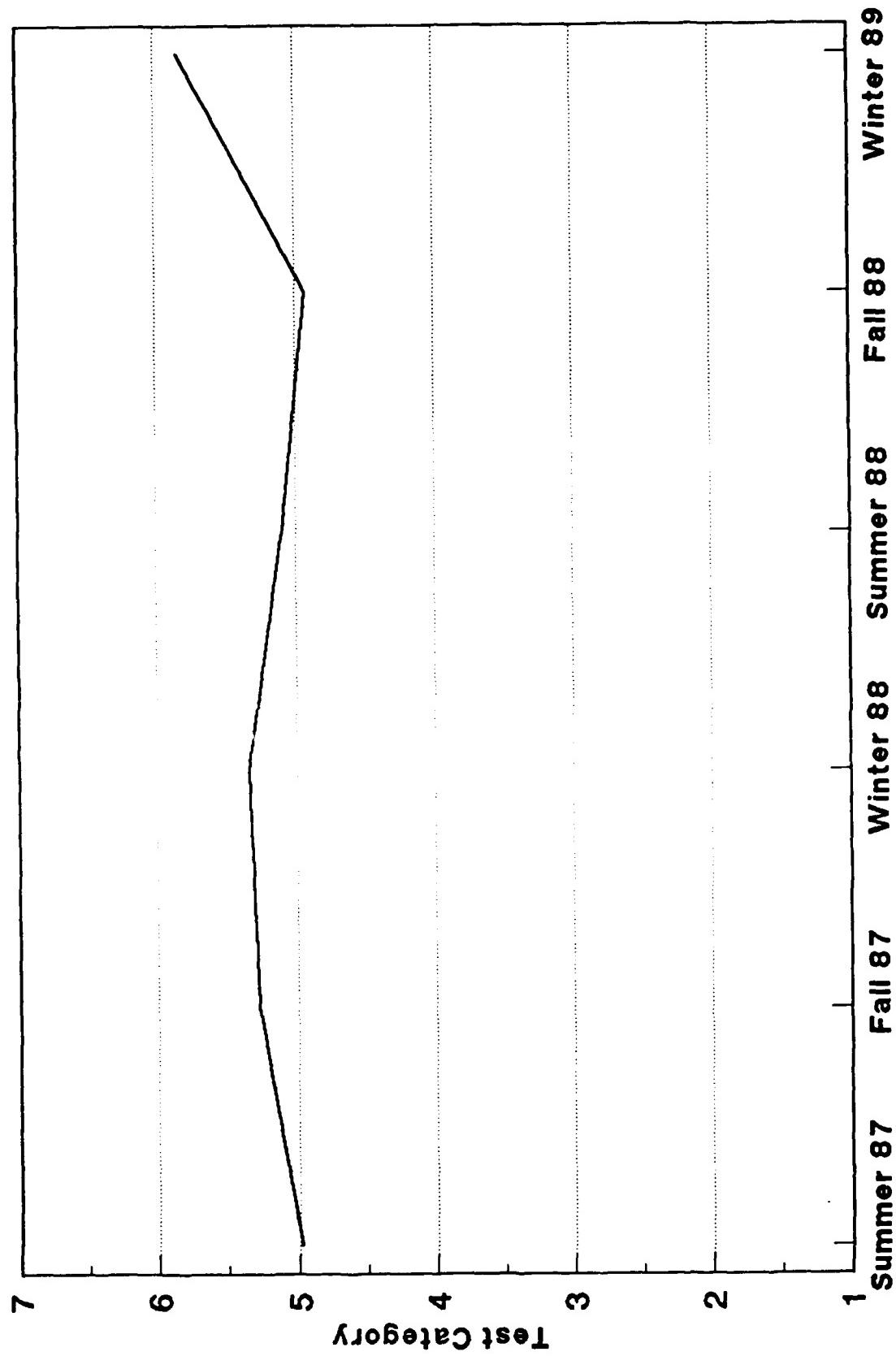


Figure 5. Mean AFQT over two years

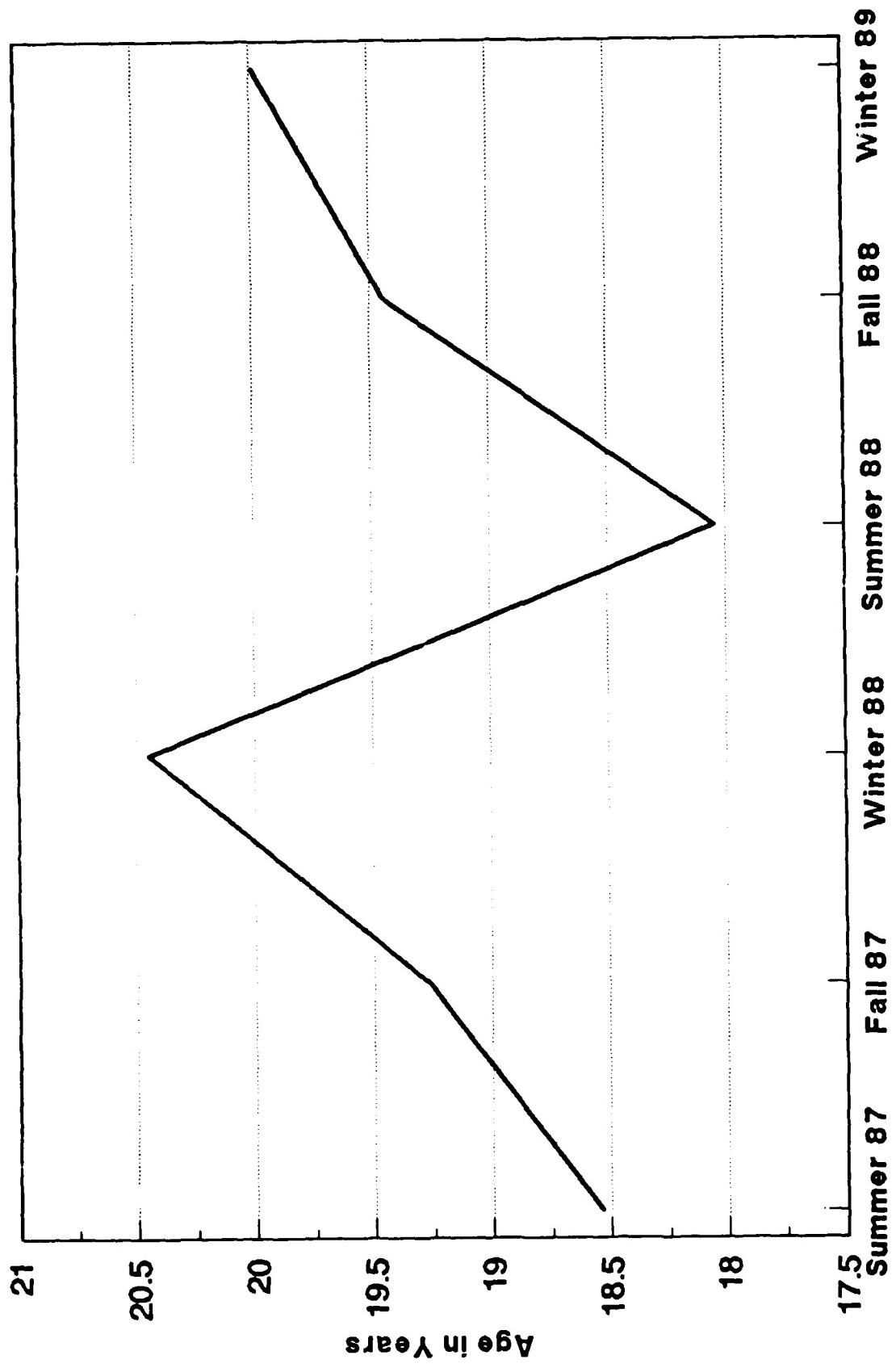


Figure 6. Mean age at contract

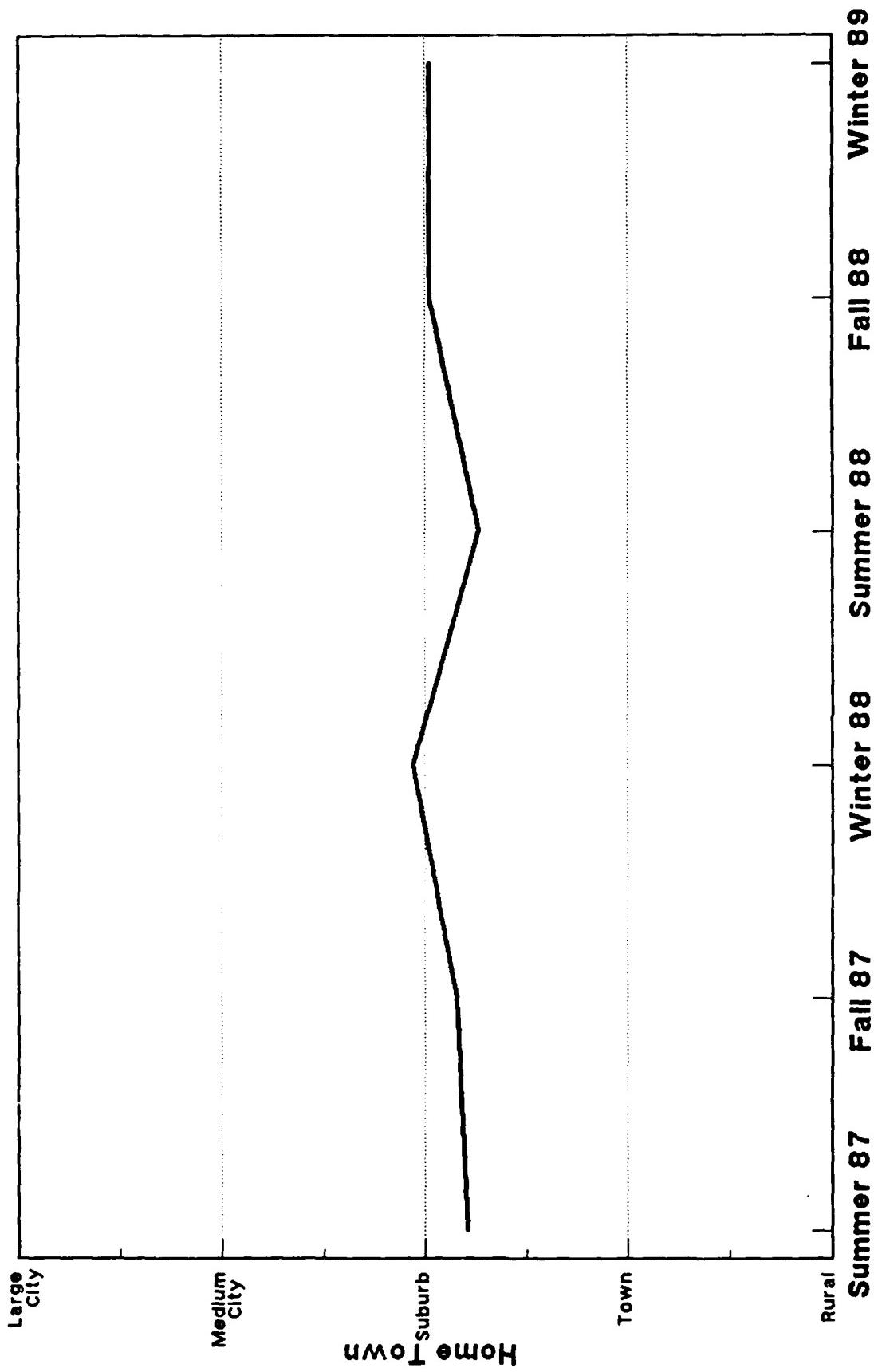


Figure 7. Mean size of home town

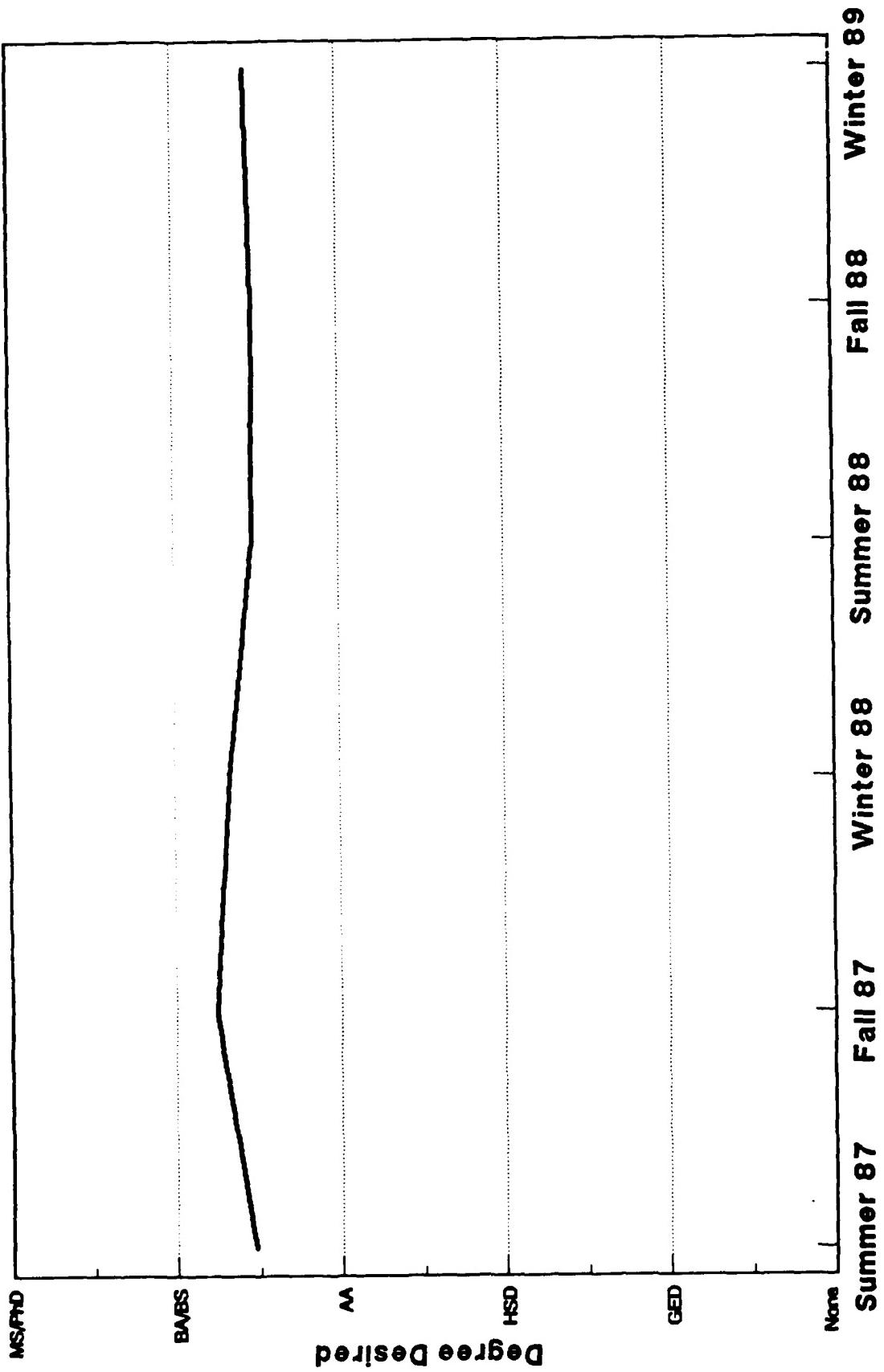


Figure 8. Mean educational goals

term for the summer samples is less than that for the other trimesters, individually or in combination. In addition, the linear, quadratic, and cubic trend components are all statistically significant; however, note the strong linear trend in the data. This upward linear trend is shown quite clearly in Figure 9, which indicates an increase in average enlistment term over the two years of the NRS data, in conjunction with a seasonality effect.

Length of time in the DEP. Only the 1988/1989 NRS data are included in this analysis, because the 1987/1988 data were not available. Previous analyses showed that recruits accessioning during the summer trimester have generally spent a longer period of time in the DEP than those entering at other times of the year. The ANOVA results here confirm that the mean number of days spent in the DEP is significantly greater for the summer sample than for the other two, with trimester accounting for about 31% of the variability in DEP time. Because only three trimesters are included here, it is not possible to meaningfully test for trends.

Summary. Of the six variables examined here, our ANOVA approach found statistically significant seasonality effects in all of them, probably due to the large sample sizes. However, seasonality in two of these variables--size of hometown and educational goals--does not appear to be of any practical significance. Of the remaining four variables, trimester effects account for only a small proportion of the variance (less than 10%) in three of them--AFQT category, age at contract, and enlistment term--but significant comparisons and trend components suggest that these variables may warrant further examination or weighting of the data. In the remaining variable--length of time spent in the DEP--trimester effects appear to be quite large, accounting for about 31% of the variability in DEP time.

Enlistment Motivations

The enlistment motivations portion of the NRS asks recruits to rate the importance of a series of 25 reasons for enlisting. Each item is rated on a four-point scale from 1 (Not at all important) to 4 (I would not have enlisted except for this reason). Rather than examining these data on an item-by-item basis, we have taken advantage of recent factor-analytic and reliability studies of the questions (Baker, 1990). These techniques group similar items into a series of short scales, reducing the redundancy among questions and eliminating those which do not contribute substantially to the measurement of enlistment motivations. Analyses here include the seven scales developed from the factor analysis, plus three individual items which seem to add unique information not covered elsewhere. The scales and items are shown in Table 3.

For these items, the analysis of variance approach is appropriate, as they are rated on quasi-interval scales.

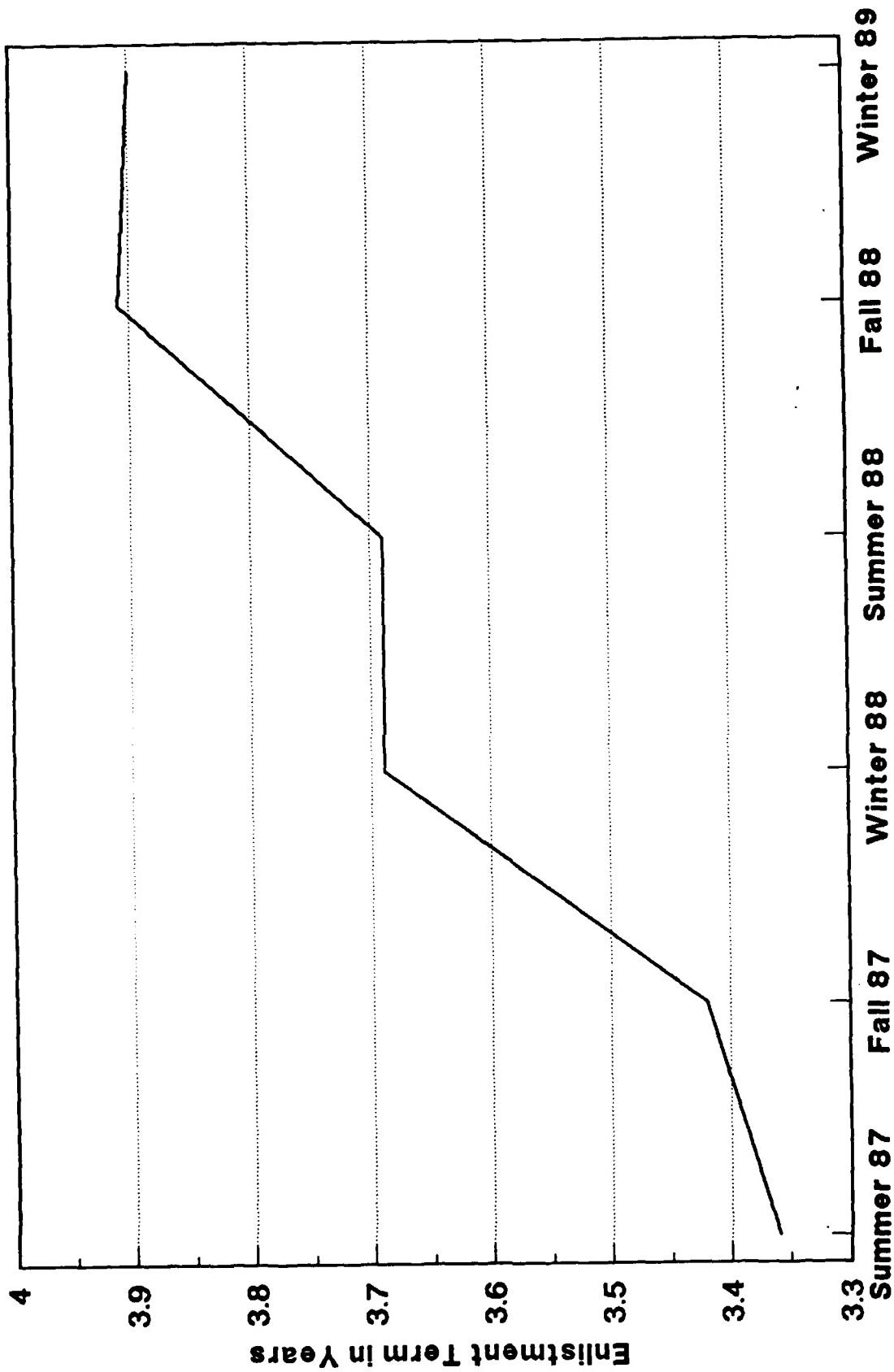


Figure 9. Mean enlistment term

Table 3
Enlistment Reasons Scales and Items

Scale	Items
Self-Improvement	T095 Importance of becoming a responsible person T093 Importance of becoming more self-reliant T089 Importance of becoming a better individual
Benefits	T087 Importance of retirement benefits T088 Importance of fringe benefits
Being a Soldier	T074 Importance of serving my country T080 Importance of wanting to be a soldier
Job Skills	T069 Importance of unemployment T096 Importance of getting a better job T078 Importance of skill training T075 Importance of earning more money
Travel	T070 Importance of being away from home T072 importance of travel
Education Money	T079 Importance of money for college T082 Importance of money for votech/business education
Women's Opportunities	Y001 Importance of men and women treated equally Y002 Importance of military exp. to both men/women
	T086 Importance of leadership training T083 Importance of physical training Y003 Importance of working with high-tech equipment

Although sometimes considered ordinal, these kinds of rating scales "have 'equal enough' intervals for most purposes" and have been found to behave like equal interval scales (Cohen & Cohen, 1975). Therefore, the approach described above was used to examine seasonality in enlistment motivations. Table 4 shows the mean scores and standard deviations for each scale or item, as well as the ANOVA results, while Table 5 shows the results of the planned comparisons and trend analysis. As before, the R^2 values represent the proportion of the variability in scale or item scores which can be accounted for by trimester differences.

As Table 4 indicates, all analyses of variance yield statistically significant results, but also account for very little variance in the scale scores. Simple examination of the means and standard deviations across the six trimesters suggests that they do not vary much. The fact that the standard deviations for each scale are also comparable across trimesters, rather than widely discrepant, also suggests a certain homogeneity of results across trimesters (Keppel, 1973). Although several of the planned comparisons and trend components are statistically significant, all of them account for less than 1% of the variability in scale or item scores.

Original analyses indicated that the summer trimester might produce smaller proportions of recruits who enlisted for reasons of the chance to better oneself, college money, unemployment, and training, and a larger proportion who enlist for the opportunity to serve the country. Consequently, we would expect the summer samples to produce lower mean scores on the Self-Improvement, Education Money, and Job Skills scales, and higher mean scores on the Being a Soldier scale.

For both self-improvement and job skills, the comparisons between the summer and the other trimesters are significant; however, the differences in mean scores between trimesters are so slight and the R^2 values so low, that any differences do not seem to be important. For education money, the only significant comparison is summer versus winter, and it seems to be due mainly to the lower mean score for the Winter 1989 sample. Given the extremely low R^2 , this does not appear to represent an ongoing, meaningful difference among trimesters. For being a soldier, the comparisons suggest that although summer differs from fall and from winter, it does not differ from the average of the other two trimesters. Again, the R^2 value is so small that differences do not appear to be meaningful. Thus, any seasonality effects in the enlistment motivations data for accessions may not be significant in a practical sense.

Loss of Enlistment Incentives

The section of the NRS concerned with the loss of certain enlistment incentives asks recruits to indicate what they would have done had the Army College Fund (ACF), Cash Enlistment Bonus, and Two-Year Enlistment Option not been available. Items are

Table 4

Scale Means and Analysis of Variance Results for Enlistment Reasons

Scale/Item	<u>Trimester</u>						<u>ANOVA Results</u>		
	Summer 1987	Fall 1987	Winter 1988	Summer 1988	Fall 1988	Winter 1989	F	p	R ²
Self-Improvement									
M	2.60	2.60	2.61	2.60	2.65	2.65	4.00	.0013	.002
SD	0.70	0.74	0.75	0.72	0.73	0.75			
Benefits									
M	2.19	2.22	2.30	2.22	2.27	2.31	8.19	.0001	.003
SD	0.77	0.78	0.78	0.77	0.79	0.78			
Soldier									
M	2.33	2.22	2.34	2.27	2.30	2.32	7.76	.0001	.003
SD	0.72	0.72	0.73	0.74	0.76	0.76			
Job Skills									
M	2.01	2.04	2.04	2.02	2.08	2.14	11.21	.0001	.004
SD	0.61	0.62	0.67	0.61	0.63	0.63			
Travel									
M	2.11	2.03	2.04	2.12	2.10	2.03	8.14	.0001	.003
SD	0.66	0.66	0.70	0.69	0.69	0.70			
Education Money									
M	2.43	2.48	2.43	2.46	2.42	2.35	4.53	.0004	.002
SD	0.87	0.87	0.88	0.85	0.88	0.86			
Women's Opportunities									
M	1.72	1.66	1.70	1.62	1.73	1.69	6.69	.0001	.002
SD	0.69	0.66	0.70	0.65	0.70	0.68			

Table 4 continued

Scale Means and Analysis of Variance Results for Enlistment Reasons

Scale/Item	<u>Trimester</u>						<u>ANOVA Results</u>		
	Summer 1987	Fall 1987	Winter 1988	Summer 1988	Fall 1988	Winter 1989	F	p	R^2
Leadership Training									
M	2.21	2.15	2.26	2.16	2.23	2.28	6.56	.0001	.003
SD	0.85	0.81	0.86	0.85	0.86	0.86			
Physical Training									
M	2.39	2.36	2.44	2.33	2.39	2.40	3.07	.0089	.001
SD	0.83	0.82	0.85	0.83	0.84	0.83			
Working with High-Tech Equipment									
M	2.08	2.14	2.08	2.14	2.15	2.19	3.98	.0013	.002
SD	0.89	0.90	0.89	0.90	0.90	0.89			

Note. Sample sizes vary from 12169 to 12446. Items are coded as 1=Not at all important, 2=Somewhat important, 3=Very important, and 4=I would not have enlisted except for this reason.

Table 5

Planned Comparisons and Trend Analyses for Enlistment Reasons

Scale/Item	F	p	R ²
Self-Improvement			
Trimester Comparisons:			
Summer vs. Others	8.79	.0030	.001
Summer vs. Fall	5.80	.0161	.000
Summer vs. Winter	6.96	.0083	.001
Trend Components:			
Linear	9.73	.0018	.001
Quadratic	3.82	.0506	.000
Cubic	0.00	.9831	.000
Quartic	2.09	.1482	.000
Benefits			
Trimester Comparisons:			
Summer vs. Others	20.71	.0001	.002
Summer vs. Fall	4.80	.0284	.000
Summer vs. Winter	29.27	.0001	.002
Trend Components:			
Linear	24.23	.0001	.002
Quadratic	0.20	.6543	.000
Cubic	4.90	.0269	.000
Quartic	0.96	.3267	.000
Soldier			
Trimester Comparisons:			
Summer vs. Others	0.00	.9775	.000
Summer vs. Fall	5.01	.0252	.000
Summer vs. Winter	3.92	.0477	.000
Trend Components:			
Linear	1.32	.2499	.000
Quadratic	3.32	.0687	.000
Cubic	1.96	.1616	.000
Quartic	11.25	.0008	.001
Job Skills			
Trimester Comparisons:			
Summer vs. Others	26.53	.0001	.002
Summer vs. Fall	11.23	.0008	.001
Summer vs. Winter	28.44	.0001	.002
Trend Components:			
Linear	42.65	.0001	.003
Quadratic	8.93	.0028	.001
Cubic	5.86	.0155	.000
Quartic	1.08	.2997	.000

Table 5 continued

Planned Comparisons and Trend Analyses for Enlistment Reasons

Scale/Item	F	p	R ²
Travel			
Trimester Comparisons:			
Summer vs. Others	26.48	.0001	.002
Summer vs. Fall	12.41	.0004	.001
Summer vs. Winter	26.75	.0001	.002
Trend Components:			
Linear	1.30	.2551	.000
Quadratic	0.31	.5756	.000
Cubic	36.69	.0001	.003
Quartic	0.72	.3961	.000
Education Money			
Trimester Comparisons:			
Summer vs. Others	1.53	.2157	.000
Summer vs. Fall	0.19	.6618	.000
Summer vs. Winter	5.79	.0161	.000
Trend Components:			
Linear	11.08	.0009	.001
Quadratic	8.67	.0032	.001
Cubic	0.00	.9615	.000
Quartic	1.92	.1657	.000
Women's Opportunities			
Trimester Comparisons:			
Summer vs. Others	2.40	.1216	.000
Summer vs. Fall	2.18	.1396	.000
Summer vs. Winter	1.39	.2388	.000
Trend Components:			
Linear	0.27	.6029	.000
Quadratic	7.15	.0075	.001
Cubic	2.49	.1146	.000
Quartic	2.10	.1471	.000
Leadership Training			
Trimester Comparisons:			
Summer vs. Others	7.53	.0061	.001
Summer vs. Fall	0.09	.7606	.000
Summer vs. Winter	17.48	.0001	.001
Trend Components:			
Linear	8.83	.0030	.001
Quadratic	4.99	.0255	.000
Cubic	0.76	.3826	.000
Quartic	3.22	.0728	.000

Table 5 continued

Planned Comparisons and Trend Analyses for Enlistment Reasons

Scale/Item	F	p	R ²
Physical Training			
Trimester Comparisons:			
Summer vs. Others	5.05	.0246	.000
Summer vs. Fall	0.48	.4869	.000
Summer vs. Winter	9.14	.0025	.001
Trend Components:			
Linear	0.06	.8099	.000
Quadratic	0.17	.6805	.000
Cubic	1.43	.2316	.000
Quartic	1.01	.3153	.000
Working with High-Tech Equipment			
Trimester Comparisons:			
Summer vs. Others	2.64	.1042	.000
Summer vs. Fall	3.07	.0799	.000
Summer vs. Winter	1.11	.2912	.000
Trend Components:			
Linear	13.64	.0002	.001
Quadratic	1.21	.2709	.000
Cubic	0.56	.4559	.000
Quartic	2.31	.1285	.000

Note. Sample sizes vary from 12169 to 12446. Items are coded as 1=Not at all important, 2=Slightly important, 3=Very important, and 4=I would not have enlisted except for this reason.

scored on a four- or five-point scale, depending upon whether they are inquiring about the effects of the incentive not being available in the Army specifically, or not being available in any of the military services. Response options range from 1 (Signed up for the same job anyway) to 4 or 5 (Not enlisted at all), and might be thought of as representing an increasingly negative effect of the incentive being unavailable. That is, a response of 1 (signing up for the same job) reflects no effect, while 5 (not enlisting at all) represents the greatest possible negative effect. Based on this reasoning, these items have been treated as ordinal variables.

Means, standard deviations, and ANOVA results for the enlistment incentive items are shown in Table 6. Planned comparisons and trend analysis results are in Table 7. Note that two of the six items show nonsignificant F-tests: the effect of no service having a two-year enlistment option and the effect of no service having a cash enlistment bonus. Since this indicates no significant difference among trimesters, these two items are not included in the planned comparisons and trend analysis. The remaining four tests yield statistically significant trimester differences, but also fail to account for much of the variability in the incentive items (i.e., 2% or less). Although a few of the planned comparisons and trend components are significant, all account for less than 1% of the item's variability.

It is possible that fewer significant results are found for the loss of incentive items than for others covered in this report because the sample sizes are considerably smaller. Consequently, the statistical tests have less power to detect differences among trimesters. Although the sample sizes appear to be adequate--the smallest cell size is 90 respondents, which should be ample to observe any meaningful seasonality effects--power analysis was also conducted to determine if the tests' power was sufficient to detect differences between trimesters.

Power analysis. The power of a statistical test is defined as the probability of rejecting the null hypothesis when an alternative is true; in other words, it is the probability of finding a significant effect in a sample, when that effect really does exist in the population. Power is a function of the relationship among three parameters: the significance criterion (alpha level), the magnitude of the effect in the population, and the sample size. By convention, power of .80 is usually considered adequate (Cohen, 1988; Cohen & Cohen, 1975; Keppel, 1973).

For purposes of this power analysis, item RT065 (the effect of no service having a two-year option) was selected as illustrative. The sample size is 1053, alpha was set at .05, and a detectable effect size (R^2) of .05 was chosen. Since this is the smallest sample size in the group, it should yield a conservative estimate of the F-test's power to detect trimester differences. With these parameters we find that the power is

Table 6

Item Means and Analysis of Variance Results for Loss of Enlistment Incentives

Item	<u>Trimester</u>						<u>ANOVA Results</u>		
	Summer 1987	Fall 1987	Winter 1988	Summer 1988	Fall 1988	Winter 1989	F	p	R ²
Effect of no ACF for MOS^a									
M	2.97	2.78	2.97	3.07	3.20	2.86	4.14	.0010	.012
SD	1.25	1.17	1.24	1.38	1.39	1.19			
Effect of no two-year option for MOS^a									
M	3.04	2.91	3.15	3.27	3.22	3.23	2.23	.0494	.010
SD	1.26	1.26	1.30	1.34	1.29	1.19			
Effect of no cash bonus for MOS^a									
M	1.86	2.15	1.88	2.12	1.81	1.82	2.44	.0326	.012
SD	1.23	1.14	1.07	1.41	1.10	1.20			
Effect of no service having extra educational bonus^b									
M	2.81	2.60	2.57	2.76	2.81	2.66	2.00	ns	—
SD	1.32	1.32	1.31	1.32	1.29	1.30			
Effect of no service having two-year option^b									
M	2.98	2.83	3.10	2.96	2.98	3.07	0.99	ns	—
SD	1.22	1.29	1.21	1.26	1.20	1.17			
Effect of no service having cash bonus^b									
M	1.74	1.97	1.78	2.07	1.64	1.61	3.94	.0015	.020
SD	1.12	1.11	1.03	1.26	1.00	1.06			

Note. Sample sizes vary from 975 to 1734.

^aScored on 5-point scale from 1=Signed up for the same job anyway to 5=Not enlisted at all. ^bScored on 4-point scale from 1=Signed up for the same job anyway to 4=Not enlisted at all.

Table 7
Planned Comparisons and Trend Analyses
for Loss of Enlistment Incentives

Item	F	p	χ^2
Effect of no ACF for MOS*			
Trimester Comparisons:			
Summer vs. Others	1.02	.3116	.001
Summer vs. Fall	0.19	.6619	.000
Summer vs. Winter	1.35	.2452	.001
Trend Components:			
Linear	1.37	.2422	.001
Quadratic	1.49	.2223	.001
Cubic	13.12	.0003	.008
Quartic	0.00	.9610	.000
Effect of no two-year option for MOS*			
Trimester Comparisons:			
Summer vs. Others	0.10	.7469	.000
Summer vs. Fall	0.87	.3508	.001
Summer vs. Winter	0.10	.7472	.000
Trend Components:			
Linear	5.34	.0210	.005
Quadratic	0.25	.6167	.000
Cubic	1.53	.2171	.001
Quartic	1.66	.1980	.002
Effect of no cash bonus for MOS*			
Trimester Comparisons:			
Summer vs. Others	0.79	.3730	.001
Summer vs. Fall	0.01	.9179	.000
Summer vs. Winter	2.11	.1470	.002
Trend Components:			
Linear	1.80	.1795	.002
Quadratic	3.50	.0617	.004
Cubic	1.02	.3137	.001
Quartic	0.14	.7085	.000
Effect of no service having extra educational bonus^c			
Effect of no service having two-year option^c			

Table 7 continued

**Planned Comparisons and Trend Analyses
for Loss of Enlistment Incentives**

Item	F	p	R ²
Effect of no service having cash bonus^b			
Trimester Comparisons:			
Summer vs. Others	4.15	.0419	.004
Summer vs. Fall	1.35	.2459	.001
Summer vs. Winter	5.73	.0169	.006
Trend Components:			
Linear	3.97	.0465	.004
Quadratic	8.10	.0045	.008
Cubic	0.20	.6555	.000
Quartic	0.25	.6160	.000

Note. Sample sizes vary from 975 to 1734.

^aScored on 5-point scale from 1=Signed up for the same job anyway to 5=Not enlisted at all. ^bScored on 4-point scale from 1=Signed up for the same job anyway to 4=Not enlisted at all. ^cOverall F is non-significant.

approximately .99. Even setting alpha at .01, the power is still in excess of .98. Turning the problem around and considering it from the perspective of determining an adequate sample size, we find that 250 recruits at an alpha level of .05, or 496 recruits at an alpha of .01, should be sufficient to detect an R^2 of .05, at a power of .80. Therefore, the sample sizes here certainly should be large enough to find any existing trimester differences in the loss of incentives items.

Chi-Square Analysis of Categorical Variables

Sex

Schroyer et al.'s (1988) original analysis indicated that the Summer 1987 sample underrepresented females, and this finding is confirmed by our analyses of the data from 1987/1988 ($\chi^2_{(2)}=66.93$, $p<.001$) and 1988/1989 ($\chi^2_{(2)}=123.54$, $p<.001$). Figure 10 shows a plot of male and female proportions of the samples across all six trimesters, and demonstrates a fairly clear seasonal pattern of fewer females among summer accessions, more among fall. Based on the data from these two years, it appears that a summer-only sample would tend to underrepresent female recruits by anywhere from two to six percentage points. That is, if a year-round sample contained 12% females, a summer sample would tend to include only 6-10% female recruits. Note that this seems to be a fairly straightforward tradeoff between summer and fall samples; just as a summer sample would underrepresent females, so would a fall sample overrepresent them.

Geographic Region

The original analyses of the 1987/1988 NRS data indicated that a summer sample might have a higher proportion of recruits from the Midwest and a lower proportion from the West, with other regions showing no differences. Chi-square analysis conducted on the NRS data from two full years confirms that there are trimester differences in the percentages of accessions from different geographic regions ($\chi^2_{(20)}=145.87$, $p<.001$). However, the data from two years also suggest that additional seasonal patterns may be present.

Figure 11 shows a plot of the percentage of recruits from each region in each of the six trimesters. The plot has been simplified for easier reading by eliminating the Southeast, since that region shows no major differences across trimesters (i.e., the line is almost flat), and it has also been enlarged to show greater detail by limiting the ordinate to the 10-30% range. Both the Northeast and Midwest show patterns of greater proportions in the summer and smaller proportions in the winter trimesters, while the West and Southwest show the reverse pattern.

Two cautionary notes are necessary with respect to Figure 11. First, the plot is exaggerated by limiting the range, so

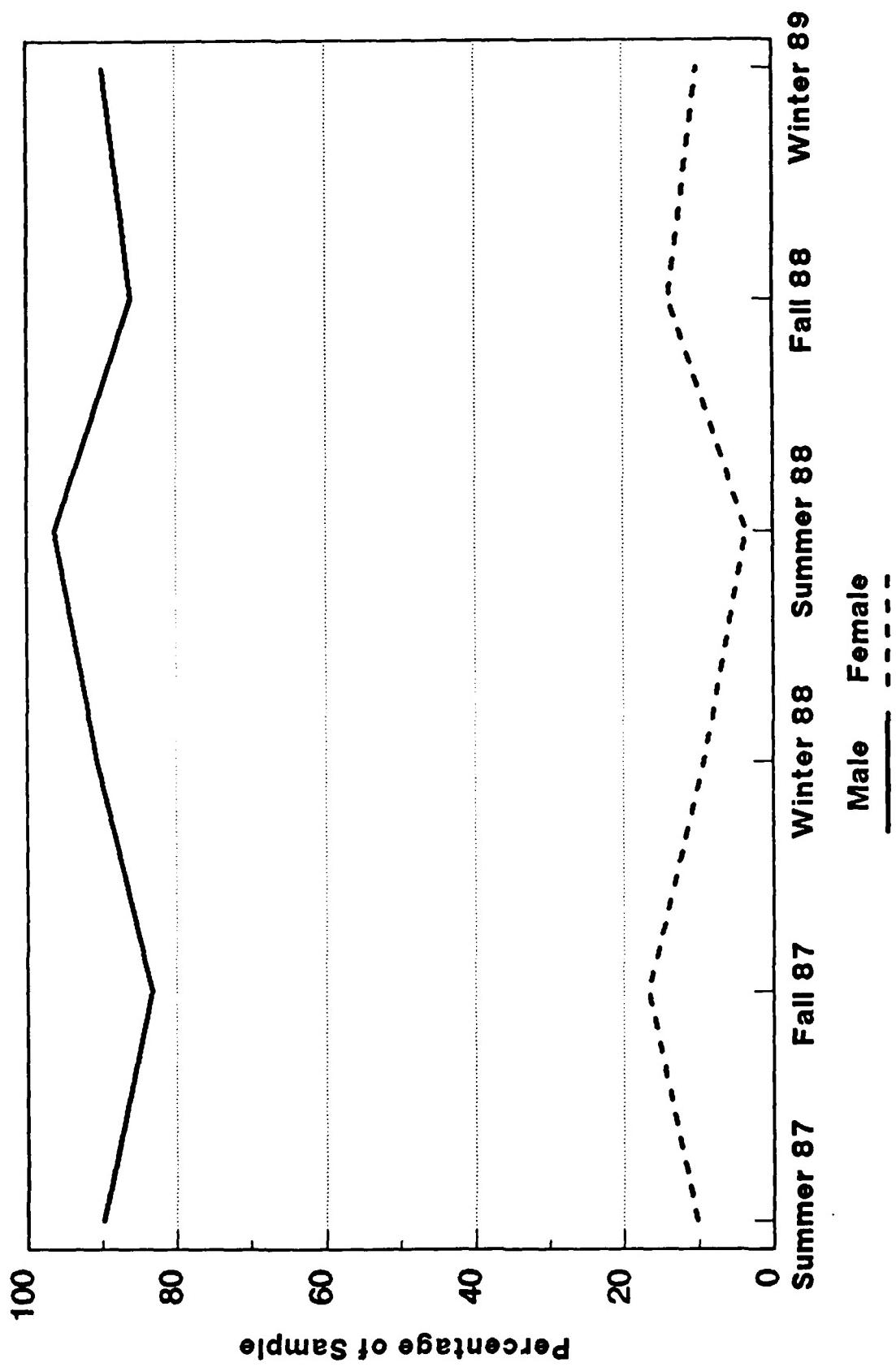


Figure 10. Sex of recruits

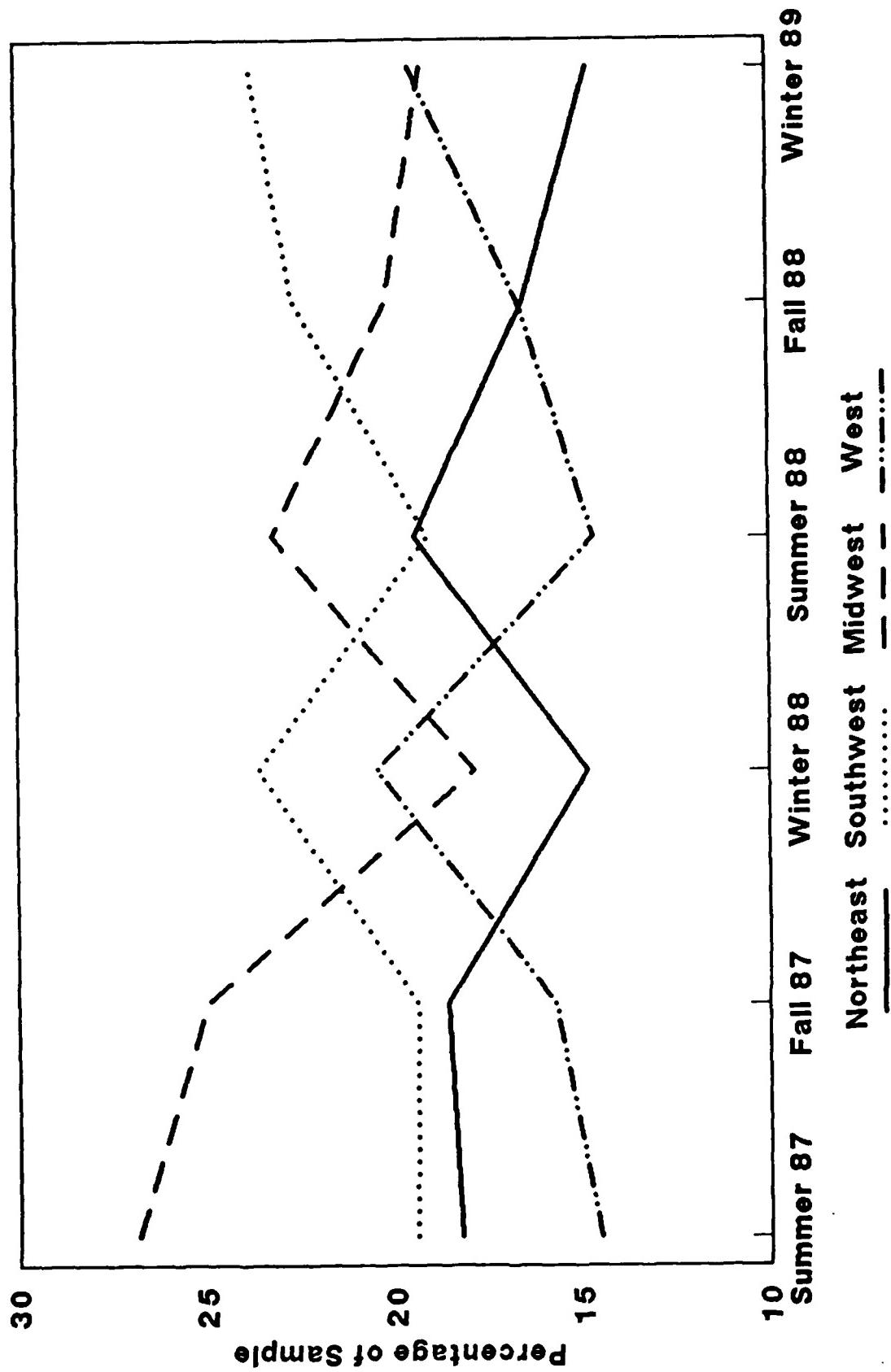


Figure 11. Geographic regions

that differences in actual percentages are not as great as they appear (they are approximately 5% of the sample, on average). Second, reciprocal patterns of this sort are partly a function of the fact that it is proportions which are being plotted. However, the apparent trends are so consistent that they suggest true seasonality effects.

First Contact with Recruiter

The original Chi-square analysis of the 1987/1988 NRS survey indicated that a summer sample might overrepresent accessions for whom the first contact was initiated by an Army recruiter, and underrepresent those who initiated the contact themselves. Other types of a first contact were equally represented in all three trimesters. Data from two years of the NRS yield similar results. There are significant differences among the trimesters ($\chi^2_{(20)}=396.28$, $p<.001$), and the same pattern appears.

Figure 12 shows a plot of proportions across the six trimesters. There are only small trimester differences in the other three methods of first contact, but the question of recruit- versus recruiter-initiated contact shows a clear seasonality effect. Note also that these are large differences in proportions between the summer and winter trimesters. For example, in the 1987/1988 survey 42% of the respondents in the summer indicated that they had contacted a recruiter first, versus 64% in the winter. For the 1988/1989 survey, the summer and winter percentages of recruit-initiated first contacts are 37% versus 58%. Given the magnitude and consistency of these differences, it appears that seasonality effects are present in the first contact with a recruiter.

Circumstances of First Contact

Original analysis suggested that sampling from the summer only might produce a greater proportion of recruits who first met with an Army recruiter at school, and a smaller proportion who first met at a recruiting station, with other circumstances equally represented in all three trimesters. Chi-square analysis of the data collected over two years confirms this finding ($\chi^2_{(25)}=279.68$, $p<.001$).

A plot of proportions across the six trimesters is shown in Figure 13. Again, the summer-winter disparity is fairly large. For example, the summer samples consist of 20% and 22% school contacts, versus 9% and 11% for the winter. In view of this pattern, it seems that the circumstances of the first contact with a recruiter do consistently vary by season.

DISCUSSION

Among the variables examined in this report, several do appear to have seasonality effects, while others show some statistically significant differences, but may or may not have

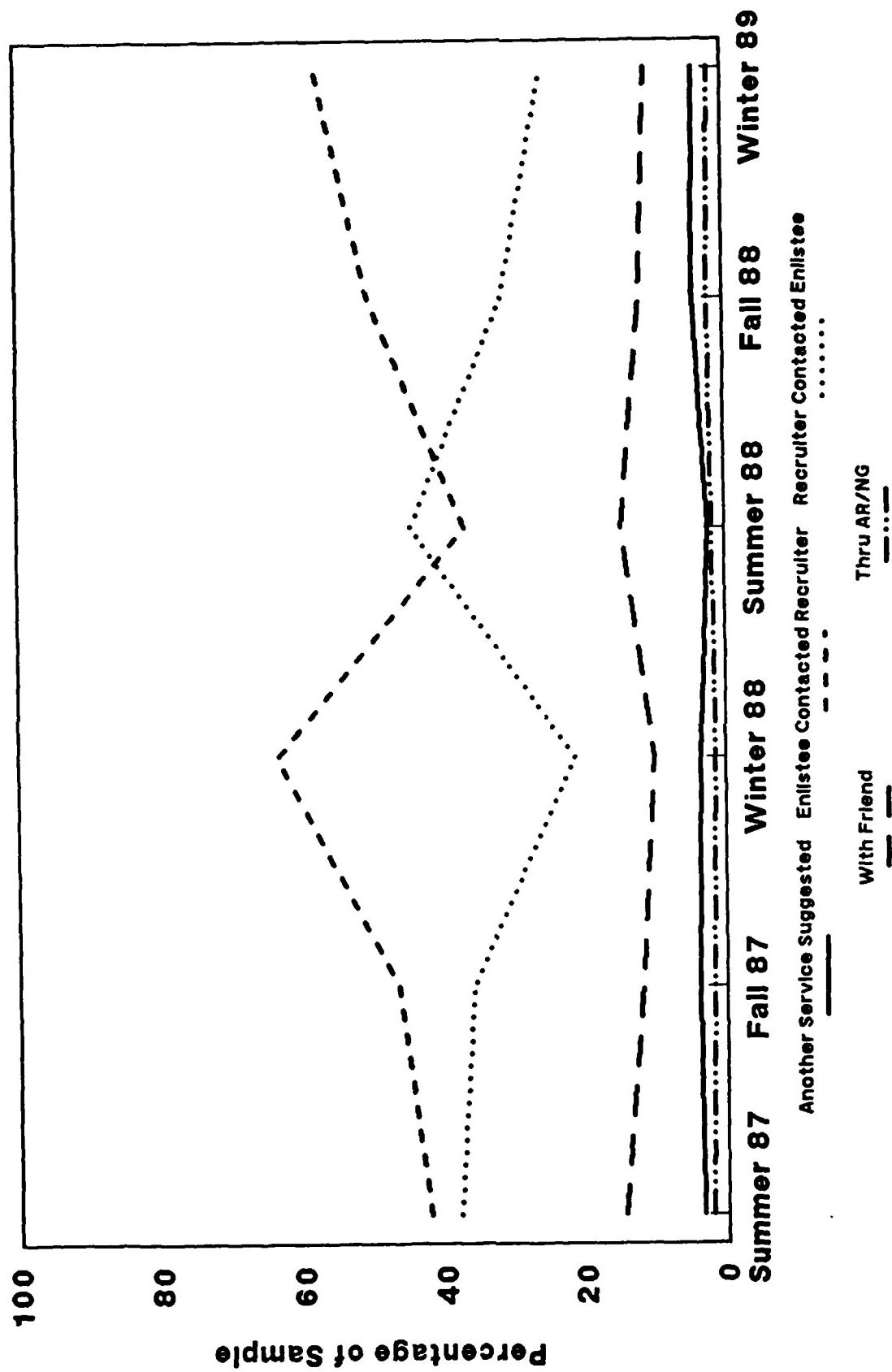


Figure 12. First contact with recruiter

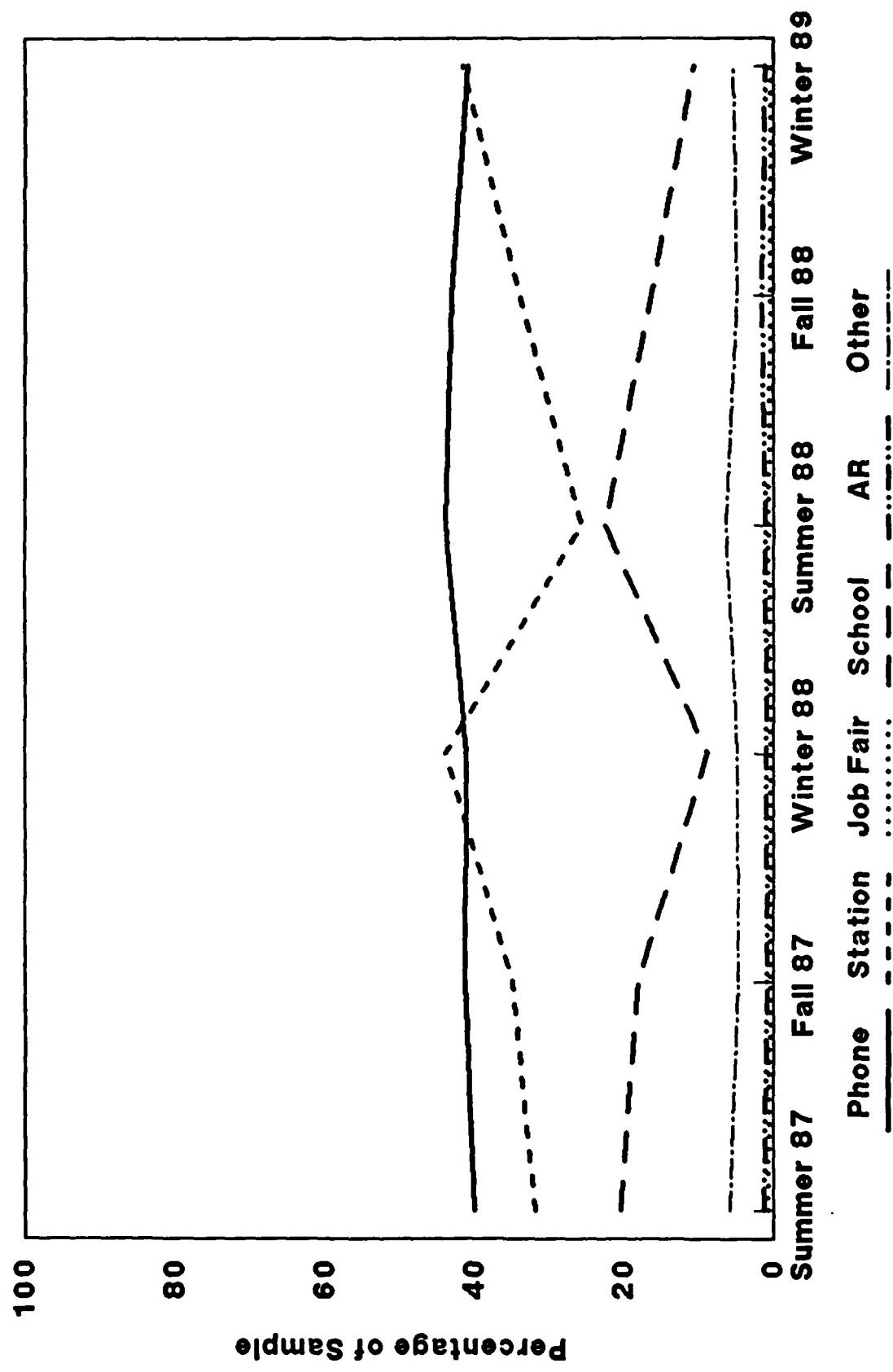


Figure 13. Circumstances of first contact

seasonal effects in a practical sense. And a few do not appear to have meaningful seasonal patterns of differences among new recruits. Results are summarized below.

Personal and Demographic Characteristics

Ethnic group. Ethnicity does not appear to have significant seasonal effects. Proportions of recruits in each ethnic group are quite similar across the three trimesters.

Sex. A summer-only sample would tend to underrepresent female recruits by a few percent. Whether this difference is of any practical significance is, of course, another question. If the data from the surveys are ordinarily analyzed separately by sex, then seasonal cycles may not be particularly important. We simply need to be sure that the female sample is large enough so that we can rely on the results to represent all female recruits.

AFQT category. The data suggest that sampling from the summer would tend to underrepresent the higher level categories, and overrepresent the lower ones, leading to a lower average AFQT score than that found in the other trimesters.

Age at contract. It appears that a sample drawn only from summer accessions would tend to overrepresent those recruits who contracted at younger ages. The average (contract) age of summer accessions is almost two years less than that of winter accessions. This is probably because of the school year cycle noted earlier, since many summer accessions are recent high school graduates. Many will be those who contracted while still in high school, when they were younger.

Geographic region. The data indicate that a summer sample would slightly overrepresent the Midwest and Northeast regions and slightly underrepresent the West and Southwest. The Southeast region appears to be equally represented in all three trimesters. On a conceptual level, these results also make some sense, as one would expect recruits from the West to be more similar to those from the Southwest than to those from, say, the Northeast.

Educational goals. Analysis of the 1987/88 data indicated that sampling from the summer only might slightly overrepresent those recruits who want only a high school degree. This is also consistent with the effects of the school year cycle which have been noted a number of times. Summer accessions are most likely to be recruits who contracted with the Army while still in high school and planned to enter after graduating. Presumably, if they intended to go on for further education, they would not have decided upon the Army. Based on two years' data, however, these differences are very slight and are probably not significant in a practical sense.

Planned participation in G.I. Bill. Original analyses suggested that summer accessions might have a smaller percentage of respondents who plan to participate in the G.I. Bill, among both college- and vocational-motivated recruits. This could well be due to the school year cycle, and would tend to confirm the above finding regarding educational goals. If these recruits want only a high school degree, then there is no reason for them to plan on using the G.I. Bill for further education.

However, an analysis which limits respondents to those who are aware of the G.I. Bill, but have not yet discussed it at the Reception Battalion, indicates that there are not significant differences among the trimesters. This suggests that recruits may respond differently, depending upon how much information they have received. For this reason, the most accurate reading of what the recruits' intentions were prior to accessioning may come from those who are surveyed at an earlier stage of their processing.

Size of hometown. The chief difference seems to lie between rural and urban areas, with the summer months producing more recruits from rural and farm areas and fewer from large cities. However, the differences are minor and may not be of practical significance.

Contract Variables

Enlistment term. Data suggest that a summer sample would slightly overrepresent recruits who have enlisted for two or three years, while underrepresenting four-year enlistments to a considerable degree. In addition, there is a clear upward trend in length of enlistment term.

Length of time in the Delayed Entry Program (DEP). In general, recruits entering the Army during the summer months have spent a longer time in the DEP than those entering during the fall or winter. The disparity is, in fact, quite large, with an average of about 207 days in the DEP for summer accessions, 95 for fall, and only about 59 days for winter recruits. This is probably also a function of the school year cycle. Many recruits accessioning during the summer are those who contracted and entered the DEP during the previous year while they were still in high school. Since a certain minimum amount of time is required for them to complete school before entering the Army, they have spent a longer time in the DEP, in contrast to recruits who have already graduated from high school and are thus more immediately available.

We note also that since DEP loss increases with length of time in the DEP (Phillips & Schmitz, 1985), a summer-only sample may produce favorable, but somewhat misleading, survey responses. Because the summer accessions are those recruits who have had the greatest opportunity to leave, but have not done so, data from

such a sample may be biased by recruits who have the greatest commitment to joining the Army.

Survey Variables

First contact with recruiter. The primary difference seems to lie in who first initiated the contact--the recruit or an Army recruiter. Analyses indicate that a summer sample may be biased toward those recruits who were first contacted by a recruiter rather than initiating that contact themselves. Other means of a first contact (advice from another service, being with a friend, contact through an Army Reserve or National Guard unit) appear to be equally well represented in all trimesters, and not subject to strong seasonal effects. Again, this appears to be due to the school year cycle previously discussed. Since summer accessions include a large number of recent high school graduates, they are also most likely to be those recruits who were first contacted by an Army recruiter during their last year in high school.

Circumstances of first contact with recruiter. In contrast to the other trimesters, the summer contains a larger proportion of recruits who first met a recruiter at school, rather than at a recruiting station. This is entirely consistent with the school year cycle effects discussed above. Summer accessions are most likely to be those who were first recruited by an Army recruiter who visited their high school. Thus, a summer-only sample may not be representative of the entire year.

Reasons for enlisting. The 1987/1988 NRS data suggested that sampling from only the summer trimester might produce significantly smaller proportions of recruits for whom the most important reasons for enlisting are unemployment, the chance to better oneself, college money, and training. With respect to unemployment, at least, this finding could also be a result of the school year cycle. Summer accessions who have just graduated from high school are also likely to be least concerned with being unemployed--either because they contracted while still in high school and thus are not seeking full-time work, or because unemployment has not yet had sufficient time to become an issue for them. A summer sample also might produce a significantly larger proportion of recruits who enlisted for the opportunity to serve the country. The latter would tend to be consistent with the above reasoning regarding length of time in the DEP.

Based on two years' data, however, it appears that trimester differences in enlistment motivations are only modest. While scales representing the motivations noted above do show statistically significant differences among trimesters, the trimesters also account for only a small amount of the variability in scale scores and may not be different in a practical way. In addition, for opportunity to serve, differences among trimesters are not in the expected direction, as the summer trimester is actually the most "average" (fall is

lower, winter is higher), rather than the highest in this enlistment motive.

Loss of enlistment incentives. For these variables, two of the six items tested show non-significant differences among trimesters (the effect of no service having a two-year option and the effect of no service having a cash enlistment bonus). The other four tests result in statistically significant differences, but the trimesters still fail to explain a major portion of the variance in recruits' responses. Consequently, whatever differences do exist may not be of practical importance.

Trimester Profiles

Table 8 shows the proportions of the personal and demographic characteristics found in summer, fall, and winter recruits (aggregated across two years), as well as the proportions from a combined total of all six trimesters. These results are also illustrated in Figure 14. We caution that Figure 14 does not represent the plot of a continuous variable. The proportions are discrete points, and have been connected by lines merely in order to illustrate the "profiles" of trimester versus year-round samples.

For purposes of the figure, we have taken the most common value of each variable to represent the year-round "baseline." For example, considering data covering the full two years from June 1987 through May 1989, the most frequent age at contracting is 17 years old. Therefore, the proportions of 17-year-olds for year-round and trimester samples are used in the plot. For AFQT category, we have combined Categories I, II, and III-A, to give a clearer picture of the distribution of the higher level categories. Note in Table 8 that there are very large discrepancies in the proportions of AFQT categories across the trimesters, especially Category I.

The most obvious points of disparity from the baseline (year-round sample) are age at contracting, AFQT category, enlistment term, and recruit-initiated first contact. Other variations from baseline are either nonexistent or minimal. The most distinct difference seems to be between the summer and winter trimesters, with the fall trimester typically falling somewhere in the middle and closest to the baseline profile generated from the combined data. The summer sample is younger (mean age, 18.35) and more predominantly male, with a lower AFQT score, shorter enlistment term, and greater probability of having been contacted by a recruiter first. By contrast, the winter NRS sample is older than the summer by almost two years (mean age, 20.21), and far more likely to have an AFQT Category I score, to have enlisted for four years, and to have initiated the first contact with a recruiter. Given these results, if only one trimester could be used as a sample to represent accessions from June through the following May, fall would probably be the preferred choice. However, in view of the timing of decisions

Table 8
Proportions of Recruit Characteristics
in Trimester and Year-Round Samples

Characteristic	<u>% of Recruits</u>			Year-Round 1987/89
	Summer	Fall	Winter	
Ethnic Group				
White	68.0	66.7	68.0	67.5
Black	24.8	25.8	24.1	25.0
Hispanic	4.1	4.2	4.8	4.3
Other	3.2	3.3	3.1	3.2
Sex				
Male	92.3	84.7	90.3	89.0
Female	7.7	15.3	9.7	11.0
Age at Contracting				
17	48.4	21.2	6.6	28.1
18	25.5	30.9	24.2	27.2
19	9.7	17.0	23.0	15.7
20	4.9	9.0	15.5	9.1
21	2.8	6.2	8.5	5.5
22	2.5	4.5	6.0	4.1
23	2.0	3.3	4.4	3.1
24	1.0	1.9	3.0	1.8
25	0.9	1.5	2.1	1.4
Over 25	2.3	4.5	6.6	4.1
AFQT Category				
I	6.0	5.9	33.3	13.0
II	30.5	36.1	23.4	30.7
III-A	25.0	29.3	20.0	25.2
III-B	36.2	21.9	17.1	26.2
IV-A	2.3	6.7	6.1	4.8
IV-B	0.0	0.1	0.0	0.1
Enlistment Term				
2 Years	10.8	7.8	7.0	8.7
3 Years	35.0	27.5	17.8	27.9
4 Years	50.5	58.2	66.8	57.4
5 Years	2.8	4.0	5.2	3.8
6 Years	0.8	2.4	3.1	2.0
8 Years	0.1	0.0	0.1	0.2

Table 8 continued

Proportions of Recruit Characteristics
in Trimester and Year-Round Samples

Characteristic	<u>% of Recruits</u>			Year-Round 1987/89
	Summer	Fall	Winter	
Geographic Region				
Northeast	18.7	17.6	14.8	17.3
Southeast	21.9	22.6	23.0	22.5
Southwest	19.3	21.0	23.7	21.0
Midwest	25.5	22.7	18.6	22.7
West	14.6	16.2	20.0	16.5
Type of Home Town				
Rural/Farm	24.5	20.4	19.0	21.6
Town	25.9	25.2	24.2	25.2
Suburb	14.9	16.5	15.7	15.7
Medium City	17.3	18.2	18.1	17.8
Large City	17.4	19.7	22.9	19.7
First Contact with Army Recruiter				
Other Service	3.0	4.0	3.9	3.6
Recruit Initiated	40.2	48.4	60.4	48.2
Recruiter Initiated	40.4	33.7	23.5	33.7
With Friend	14.5	11.9	10.5	12.6
Through AR/NG	2.0	2.0	1.8	1.9
Circumstances of First Contact				
Telephone	41.4	42.1	40.9	41.5
Recruiting Station	29.5	34.4	42.6	34.5
Job Fair	0.6	0.4	0.4	0.5
School	21.2	17.2	9.8	16.9
Army Reserve	1.2	1.2	1.1	1.2
Other	6.0	4.8	5.2	5.4
Educational Goals				
MS/PhD	26.1	28.8	28.2	27.6
BA/BS	36.6	37.8	36.9	37.1
AA/AS	18.1	17.0	18.3	17.8
High School Diploma	10.5	8.6	7.7	9.1
GED	0.8	0.8	2.0	1.1
None of Above	7.9	7.0	6.9	7.3

Note. Percentages do not always total 100 due to rounding errors.

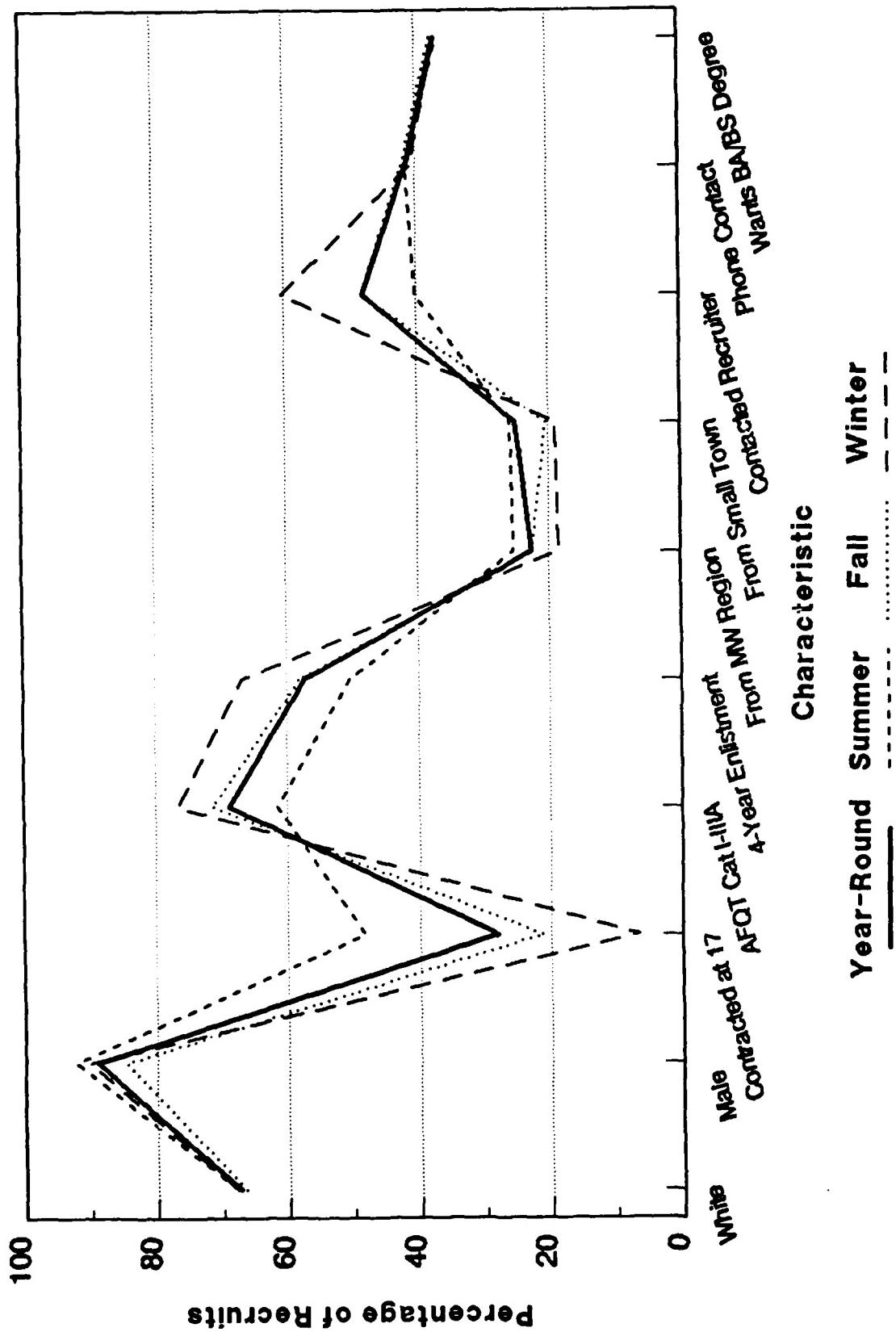


Figure 14. Recruit characteristics in trimester versus year-round samples

about recruiting policies and advertising strategies, sampling from the fall trimester may not be feasible.

Summary and Conclusions

In general, we find somewhat fewer seasonality effects than might be expected on the basis of data from only one year of the New Recruit Survey. With only one year's data, the only viable approach is to look for differences among trimesters. However, with two or more years' data, our concern is not simply with differences among trimesters, but with differences which follow a regular, seasonal pattern. Even systematic differences across time cannot form the basis for a yearly sampling scheme unless such differences coincide with an annual cycle. If, for example, there were cyclical patterns of variation which occurred at 17-month intervals, then a longer period than a year would need to be considered. In addition, for variables with upward (or downward) linear trends, sampling from only one trimester would bias the results within each year, but would not make any difference across years.

An R^2 of .05 was somewhat arbitrarily selected as a rough rule of thumb for deciding whether or not trimester differences are meaningful in a practical sense. Since a large sample is involved (over 12,000 soldiers), the statistical tests have the power to detect even slight variations among trimesters, as shown by the power analysis. If trimester differences account for less than 5% of the variance in an item, however, that leaves a considerable amount of variance unexplained. Quite likely, there are other, and more important, factors at work in that 95% of the variability for which we cannot account. In addition, the R^2 's for the trimester comparisons may be slightly inflated, since these comparisons are nonorthogonal and thus overlap slightly.

In the same vein, Chi-square analyses, although statistically significant, may reflect unimportant differences. Fleiss (1973), for example, notes that two populations will inevitably differ to some extent, but that difference may be trivial. As Fleiss states, "no matter how small the difference is between the two underlying proportions--provided it is nonzero--samples of sufficiently large size can virtually guarantee statistical significance" (p. 23). Both Chi-square and F-tests deal with the statistical significance of relationships among variables; neither type of test addresses the issue of the magnitude of such relationships (Fleiss, 1973; Kerlinger & Pedhazur, 1973). Although the nature of statistics precludes testing for and proving an hypothesis of "no difference" among trimesters, with this large a sample it is probably safe to conclude that no practical differences exist in those cases where the tests are non-significant.

Seasonality per se is not necessarily grounds for deciding against a summer-only sample. Consider, for instance, a case where the fall trimester consistently contained a smaller

proportion of some characteristic than the summer did, and the winter trimester consistently contained a larger proportion than the summer. Of course, the exact results would depend upon the actual figures, but in general the fall and winter would tend to average out to be approximately equal to the summer. In this kind of situation, the summer trimester would be most representative of the entire year. This type of result is found in the Being a Soldier scale of the enlistment motivations items, where the summer differs from both the fall and the winter, but does not differ from the mean of the other two trimesters.

In general, the impression from the ANOVA results is that the major difference lies between the summer and the winter trimesters. Although not true in every case, the difference between summer and winter is typically larger than that found between summer and fall. This is especially noticeable in the cases of AFQT category, age at contract, enlistment term, and DEP time. It also seems to be true of the Benefits, Education Money, Leadership Training, and Physical Training scales from the enlistment motivations items, although very little variance is accounted for in these analyses. Where significant differences are found between the summer and the fall-winter average, it appears that the winter trimester is generally making the larger contribution to the significant comparison. This impression is also confirmed by Figure 14, which clearly shows fairly large discrepancies between summer and winter samples.

Decisions regarding which trimester(s) to sample from must also depend upon the type of recruit of most interest to USAREC. If the primary interest is in the sort of new recruit most commonly found in the summer, then a summer sample may be the best choice. If, on the other hand, the NRS is intended to represent all accessions throughout the year, then a summer sample may not be adequate without modifications. Overall, it appears that it would be feasible to return to a summer-only administration of the NRS. Such seasonal differences as exist can most likely be adjusted for by weighting the data so that the summer recruits will reflect the year's population of accessions.

We emphasize that this entire report is based on the notion of seasonality in accessions rather than in contracts. For a true portrait of seasonal enlistment patterns, it is necessary to look at seasonality in contracts as well as in accessions. It may, however, be difficult to determine seasonal effects in enlistments by surveying recruits at the time of accession, since this approach relies heavily on the new recruit being able to remember and report accurately on events, thoughts, and perceptions which occurred during an earlier time. Memory can be distorted by intervening cognitive processes, such as cognitive dissonance and self-attributional processes, and recruits' needs to justify their choices may lead to changed beliefs about and attitudes toward their choice of the Army. While the NRS data provide valuable information on those factors which the recruit believes are influential in his or her accession, they may not

reflect the influences and motivators which existed at the time of the original enlistment decision. Therefore, we caution that results reported here cannot answer the question of whether or not there are seasonal patterns in those beliefs, attitudes, and motivations which lead to enlistment.

Further analyses of the NRS data are planned which will be based on the time at which the recruits signed their contracts. However, such analyses are still limited by the fact that the data are collected, not at contracting, but at the time of accession. Consequently, results may be subject to selection and cognitive biases. That is, some individuals may sign contracts, but then withdraw from the DEP prior to accession. These persons would have, in effect, selected themselves out of the process, and would not be included in the NRS data. In addition, data collected at accession do rely, as noted above, on the ability and willingness of respondents to recall earlier motivations and events. Thus, the data may be subject to certain cognitive distortions.

Even though such analyses would be limited by some sources of bias, analyses of NRS data based on a contracting period could provide a preliminary look at seasonal differences that would be measured by a year-round sample of newly contracted soldiers. Such analyses are currently limited to one year of contracts, because recruits can enter the Army the day they contract or as long as one year later. Thus, NRS data for June 1987 through May 1989 accessions would be needed to cover contracts for June 1987 through May 1988. An even longer period would be needed to include those few recruits who renegotiate their contracts, resulting in a longer time spent in the DEP.

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